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PROCEEDINGS

OF THE

Biological Society of Washington

VOLUME XX

1907

WASHINGTON
PRINTED FOR THE SOCIETY
1908

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OF THE

BIOLOGICAL SOCIETY OF WASHINGTON

For 1907

(ELECTED DECEMBER 15, 1906)

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VOL. XX, PP. VII-XII JANUARY 31, 1908

PROCEEDINGS

OF THE

BIOLOGICAL SOCIETY OF WASHINGTON

PROCEEDINGS.

The Society meets in the Assembly Hall of the Cosmos Club on alternate Saturdays at 8 P. M. Brief notices of the meetings, with abstracts of the papers, are published in *Science*.

January 12, 1907 — 423d Meeting.

The President in the chair and 40 persons present.

W. R. Maxon exhibited a nest of horse hair apparently made by a mouse.

H. M. Smith, E. L. Morris and H. W. Clark noted unusually late and early flowering of certain plants.

H. M. Smith remarked upon the death of Captain Z. L. Tanner, formerly commander of the steamer *Albatross*.

H. E. Van Deman exhibited specimens of the Grimes Golden apple.

J. W. Titcomb exhibited a frog with two pairs of hind legs.

The following communications were presented:

M. B. Waite: A New Peach Blight from California.

J. W. Titcomb: Some Work of the Beaver.

Vernon Bailey: The Mountain Haymakers or Pikas.

January 26, 1907 — 424th Meeting.

The President in the chair and 26 persons present.

H. W. Clark offered some observations on *Riccia*.

The following communications were presented:

W. H. Dall: Notes on Cretaceous Volutidae.*

O. F. Cook: Parthenogensis and Alternation of Generation in Parasitic Hymenoptera.

* Smiths. Misc. Coll. (Quar. Issue) L, pt. 1, No. 1704, pp. 1-23, March, 1907.

W. F. Wight: History of the Cowpea and its Introduction into America.*

February 9, 1907—425th Meeting.

The President in the chair and 45 persons present.

The following communications were presented:

A. D. Hopkins: Some Results of Anatomical Investigations of the Thoracic Segments of Insects.

T. H. Kearney: The Date Palm in the Northern Sahara.†

February 23, 1907—426th Meeting.

The President in the chair and 41 persons present.

W. H. Osgood commented on the animal paintings of Carl Rungius exhibited in the meeting hall.

E. L. Morris exhibited an English walnut of peculiar shell character.

M. B. Waite exhibited peach twigs with gumming fungus.

The following communications were presented:

C. V. Piper: Some Features of the Distribution of Life in the Columbia Basin.‡

L. Stejneger: The Celtic Horse in Norway.§

March 9, 1907—427th Meeting.

The President in the chair and 39 persons present.

The following communications were presented:

J. W. Gidley: A New Horned Rodent from the Miocene of Kansas.‖

W. H. Osgood: Notes on European Zoological Gardens.

C. L. Pollard: Dictionaries in their Relation to Biology.

March 23, 1907—428th Meeting.

The President in the chair and 21 persons present.

The following communications were presented:

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* Bull. 102, Part VI, Bur. Pl. Ind., 1907.

† Agriculture without Irrigation in the Sahara Desert. Bull. 86, Bur. Pl. Ind., 1905. Date Varieties and Date Culture in Tunis. Bull. 92, Bur. Pl. Ind., 1906.

‡ Flora of Washington, pp. 36 to 40; 47 to 53.

§ Smiths. Misc. Coll. (Quar. Issue) XLVIII, p. 4, May 4, 1907, pp. 169–175.

‖ Proc. U. S. Nat. Mus., XXXII, 627–636, 1907.

Ch. W. Stiles: A Re-Examination of the type of *Filaria restiformis*, an Alleged Parasite of Man.

L. H. Dewey: The Zapupe Fiber Plant of Eastern Mexico.

April 6, 1907 — 429th Meeting.

The President in the chair and 50 persons present.

A. D. Hopkins remarked upon variation in the time of budding and flowering of forest trees.

Theodore Gill called attention to new facts concerning parental care among fresh water fishes.

The following communication was presented:

George A. Soper (introduced by L. O. Howard): A Chronic Typhoid Fever Producer.

April 20, 1907 — 430th Meeting.

The President in the chair and 23 persons present.

The following communications were presented:

George B. Morse: Preliminary Observations on the Quail Disease in the United States.*

F. V. Coville: Photographic Reproductions of Rare Botanical Books.

R. E. C. Stearns: The Composition and Decomposition of Freshwater Mussel Shells, with Notes and Queries.†

May 4, 1907 — 431st Meeting.

The President in the chair and 30 persons present.

W. W. Cooke gave a résumé of the present bird migration season.

M. B. Waite and A. D. Hopkins made remarks on the budding of trees during the present season.

L. Stejneger noted the sale of photographic reproductions of rare books by certain European libraries.

The following communication was presented:

B. W. Evermann: The Golden Trout and the Southern High Sierra.‡

* Circular No. 109, Bur. of Animal Industry, May 18, 1907.

† Proc. Biol. Soc. Wash., XX, pp. 67–70, June 12, 1907.

‡ Bull. Bur. Fisheries, XXV, for 1905, 1–51.

May 18, 1907 — 432d Meeting.

The President in the chair and 35 persons present.

W. W. Cooke discussed the spring migration of birds.

W. P. Hay exhibited specimens of *Peripatus*.

H. S. Barber named two additions to the known range of *Peripatus*.

Paul Bartsch reported the destruction of the inhabitants of an aquarium by *Hydrophilus*.

A projection apparatus was exhibited and demonstrations made of ordinary, micro, vertical, and opaque projection.

October 19, 1907 — 433d Meeting.

The President in the chair and 34 persons present.

The following communication was presented:

E. D. Merrill: The Geographic Distribution of Philippine Plants. Discussions on the Distribution of Philippine Animals, by L. Stejneger, M. W. Lyon, Jr., H. C. Oberholser, and Theodore Gill.

November 16, 1907 — 434th Meeting.

The President in the chair and 45 persons present.

M. W. Lyon, Jr., Wm. Palmer, Miss E. G. Mitchell, and A. B. Baker reported the capture of otters in the vicinity of Washington.

The following communication was presented:

B. W. Evermann: Freshwater Mussels and the Pearl Button Industry.

December 14, 1907 — 435th Meeting.

The President in the chair and 23 persons present.

The following communications were presented:

M. X. Sullivan: Toxic Bodies arising during Plant Metabolism.

A. H. Howell: Notes on the Migration of Bats.*

* Proc. Biol. Soc. Wash., XXI, pp. 35–38, Jan. 23, 1908.

December 28th, 1907 — 436th Meeting.

TWENTY-EIGHTH ANNUAL MEETING.

The President in the chair and 19 persons present.

The annual reports of the Treasurer, Auditing Committee, and Recording Secretary were read and accepted.

The following officers were elected for the year 1908:

President: Leonhard Stejneger.

Vice-Presidents: T. S. Palmer, W. P. Hay, E. L. Greene, E. W. Nelson.

Recording Secretary: M. C. Marsh.

Corresponding Secretary: Wilfred H. Osgood.

Treasurer: J. W. Gidley.

Councillors: A. D. Hopkins, J. N. Rose, A. K. Fisher, A. B. Baker, David White.

The President appointed the following standing committees for the year 1908:

Committee on Publications: W. P. Hay, W. H. Osgood, J. W. Gidley.

Committee on Communications: Vernon Bailey, J. W. Titcomb, J. N. Rose, A. D. Hopkins, M. W. Lyon, Jr.

Vol. XX, pp. 1-16 February 25, 1907

PROCEEDINGS

OF THE

BIOLOGICAL SOCIETY OF WASHINGTON

A LIST OF THE MAMMALS, REPTILES AND BATRACHIANS OF MONROE COUNTY, INDIANA.

BY W. L. McATEE.

Monroe County is in the south central part of Indiana. It lies at about the northern end of what may be termed the characteristic cave region of the state. The caves, with their accompanying sinkholes, abundant springs and sparkling brooks, are the most prominent features of its surface. The range of elevation is about 250 feet and Bloomington, the county seat, which is neither the highest nor the lowest point, is 745 feet above sea level. Limestones of subcarboniferous age are the dominant outcropping formations, and it is in them that the caves occur.

The presence of numerous sinkholes, caverns and cave streams modifies the fauna considerably. This influence is most conspicuous, it is true, in the lower groups, such as insects and crustaceans, many of which are permanent residents in the caves, but batrachians and mammals, among the higher forms, also make considerable use of these subterranean dwellings. At least one salamander (*Spelerpes maculicaudus*) habitually breeds in caves, while several others often occur about the mouths. Among mammals, bats are noted frequenters of caves, where they are found the year round, sometimes in great numbers. Deer mice have appropriated caverns for habitations, and foxes have dens in them. Coons, minks and weasels visit them frequently in search of food, and their tracks are abundant in almost every cave. In former times black bears resorted to them, leaving traces of occupancy which are visible to-day.

The principal caves in Monroe County are Saltpetre, six miles southwest of Bloomington; Eller's, five miles southwest; Truitt's, four and three-fourths miles west northwest; and

Mayfield's, four miles northwest. Considerable collecting has been done at these caves. Other favorite localities for collecting are the vicinity of Stony Spring, the Cascades and Griffy Creek, each about one and a half miles in west, north, and northeasterly directions, respectively, from Bloomington and the University of Indiana; and Salamander Pond, three miles east. The above places will be mentioned frequently in the succeeding pages.

The writer's own observations were made in spare time during four years spent at the University, which was, however, principally devoted to the study of birds. Collecting in the groups now treated was unfortunately confined to a single year, but records from the catalogues of the University Museum and from the available literature have been combined with personal observations in making the list.

I am indebted to the writings of Professor W. S. Blatchley, Doctor O. P. Hay, Mr. A. W. Butler and Doctor B. W. Evermann, and to the last named gentleman as well as to Messrs. A. M. Banta, W. L. Hahn and J. D. Haseman for suggestions and notes. Mr. E. A. Preble kindly criticised the manuscript and Mr. W. H. Osgood corrected the nomenclature of the mammalia and reviewed the specimens of small rodents and the bats.

The occurrence in Monroe County of all species, except a few quoted on authority of the above mentioned writers, and one observed but not collected by myself, is authenticated by specimens in the University museum. The exceptions are starred.

MAMMALS.

The ungulates and most of the larger carnivora have vanished from our fauna, leaving behind them scarcely a trace even in tradition. The remaining animals are subject to the continual proximity of man, and only those beneath his notice are abundant.

1. **Didelphis virginiana** Kerr.

OPOSSUM.

Fairly common. A female with four young, each about six inches long, was taken May 25, 1892, and on June 1, of the same year, three young, each four inches long, together with their mother, were obtained. At present the 'possum is frequently taken but on account of its savory qualities few ever reach museums.

Specimens from Bloomington.

2. **Sciurus carolinensis leucotis** (Gapper).
NORTHEASTERN GRAY SQUIRREL.

Not so common as the next but not rare. It has been observed foraging about garbage barrels on the edge of town. The gray squirrel is most frequently found in mixed woods, particularly along streams, a sycamore being a favorite abode. Judging from caged specimens of this species, the black form is not rare.

Bloomington.

3. **Sciurus ludovicianus** Custis.
FOX SQUIRREL.

Very common. Unlike the gray squirrel, which is usually found in mixed woods, the fox squirrel is most common in more uniform growths, such as beech, in higher situations. In some places a veritable feud seems to exist between these and the red-headed woodpeckers. The latter have often been observed compelling their larger antagonists to seek safety in flight.

Bloomington.

4. **Sciurus striatus lysteri** (Richardson).
NORTHEASTERN CHIPMUNK.

Abundant. An inhabitant of roadsides and fields as well as woods. Indigenous on the University campus where it feeds in autumn upon beechnuts and berries of the Virginia creeper (*Parthenocissus quinquefolia*). Specimens are at hand from the Cascades and elsewhere, and it has been observed some distance within the mouth of Mayfield's Cave by Mr. A. M. Banta.

5. **Marmota monax** Linn.
WOODCHUCK.

Common. A railroad embankment is a favorite location for their burrows but they also take advantage of the sinkholes so abundant in the limestone of the region. They appear to wander to some extent in late May and early June, and I have found them dead in highways and stock enclosures at this season. In the present year, I have made an observation in another locality (Washington, D. C.) that shows the woodchuck to be somewhat nocturnal at times, one being seen running about at some distance from the burrow and even feeding after nine P. M. (May 19, 1906). Also, Dr. A. K. Fisher and the writer observed one voluntarily swim the Potomac at a point where it is more than a hundred yards wide (July 22, 1906).

Bloomington.

6. **Sciuropterus volans** Linn.
SOUTHERN FLYING SQUIRREL.

Common. Indigenous on the University campus and established in a barn-loft and some tree boxes in town.

Bloomington.

7. **Mus musculus** Linn.
HOUSE MOUSE.

Abundant near and in the dwellings of man, and also thoroughly established in many orchards and fields. From one nest in a field thirteen house mice were taken in the month of October. They were practically hairless when captured and their eyes were not yet open, but they were raised by feeding them milk with a pipette. They became perfectly tame and fearless and this hastened the end of all, as they persisted in leaving the cage and getting under someone's feet or a door. One killed on February 18, following, was apparently sexually mature.

An adult taken April 8, 1903, had a well marked gray spot on the forehead.

8. **Mus norvegicus** Erxleben.
HOUSE RAT.

Abundant.

9. **Peromyscus leucopus** (Rafinesque).
DEER MOUSE.

Abundant. Commonly their homes are in the rock slides or under logs and isolated stones and every wooded ravine is alive with them. They also live along fence rows and even in the open meadows and fields, but are rarer here than in the woods. Many of them occur in the caves, even at a considerable distance from the mouth.

These cave dwellers usually have a somewhat different appearance from their above-ground brethren, being more pop-eyed and having apparently larger ears and longer whiskers. This may be due to all mice in caves partaking of these particular variations, while in terrestrial specimens, some show them and others do not, the effect thus being lost. Certainly I have measured surface deer mice that had vibrissae and ears of equal or even greater length than specimens from caves.

As deer mice are often said to be strictly nocturnal, some observations tending to show that this conclusion is not strictly true may be of interest. They are at least occasionally seen abroad by day. One afternoon in October, I surprised one near a spring at some distance from its burrow, which it hurriedly sought. I have also seen them running about barnyards near woods in the early morning, and once found one feeding on a hillside at high noon. Near Washington, D. C., I have several times seen them scamper from one burrow to another in the day time, and Dr. A. K. Fisher as well as the writer, has surprised them rummaging about shelves of a cabin by day. In captivity at all events, they do not cease activity on account of daylight.

It has been said that this species is not at all carnivorous, but there is some evidence to the contrary. Many specimens are gnawed in the traps and this is probably not all due to *Blarina*, and certainly is not in the caves where the shrew has not been taken. Furthermore, suet makes an excellent bait, and I have fed caged deer mice with raw meat. Two, con-

fined in a cage with a screech owl, ate a considerable portion of the bird in one night. (See Proc. Ind. Ac. Sci. 1904, p. 84).

Taken at Cascades, Cedar Grove (½ mile east of Stony Spring), and Mayfield's Cave. The following notes on breeding habits are perhaps worthy of note. Dates of specimens taken and description of the embryos they contained: March 27, 1903, five embryos, ¾ inch long; March 28, 1903, four embryos, ¼ inch long; March 29, 1903, four embryos, very small. A brood of five young, four females and one male, were taken from an exposed nest in an orchard, April 7, 1903. They measured from 85 mm. to 87 mm. in length, the tail from 35 mm. to 35.5 mm., and the hind foot from 15 mm. to 15.5 mm. At this stage, the eyes are not open and the ears are rather small and laid back in the fur. The prominence of the head and feet is great, the skull is soft, and the tail translucent. The color is slaty, sprinkled with gray and yellowish above, sides of head light ochraceous, nose darker. The under parts and legs and feet, except a narrow strip on the outside of the legs, are abruptly white. Tail, bicolor.

10. **Peromyscus michiganensis** (Aud. and Bach.).

Common. This is the white-footed mouse of the fields, *P. leucopus*, the one of the woods. Their ranges overlap to some extent, but in general, a change from the vicinity of forests to open fields means the vanishing of *leucopus* and the appearance of *michiganensis*. I have collected but one of the present species in a wood. It was with another, presumably of the same kind, curled up in a snug little nest under a log. They were found in the month of December while snow was upon the ground. When their home was destroyed they ran over the snow in a dazed way and one was caught in the hands.

Several of this species were taken about the old ruins of a barn in a dry pasture. Dunn's meadow, Bloomington, also 1½ miles northwest.

I do not recall having seen this species recorded from Indiana. My identification has been verified by W. H. Osgood.

11. **Fiber zibethicus** (Linn.).

MUSKRAT.

Very common. Still occurs along the Jordan River in the town and in the University campus. In fall, many are found dead along the roads where they have been killed by hoof or wheel. In December, 1903, two were taken in a single week from a cellar which they entered through a tile drain. There is also a migratory or running season in late May and early June.

Bloomington.

12. **Microtus pennsylvanicus** (Ord.).

MEADOW MOUSE.

Common.

Bloomington.

13. **Microtus austerus** (Le Conte).

PRAIRIE MEADOW MOUSE.

Probably common. Taken in the same places with *Peromyscus michiganensis.*

Bloomington. Identified by W. H. Osgood.

14. **Lepus floridanus transitionalis** (Bangs).

NORTHEASTERN COTTONTAIL.

Abundant. Half-grown young taken April 12, 1903. A rabbit from Monroe County, examined by Dr. C. Hart Merriam, was pronounced not quite typical *transitionalis*, but nearer that form than to *mearnsi*.

***Canis nubilis** Say.

WOLF.

While it is doubtful whether a single wolf still lingers in even the wildest part of Monroe County, a female and litter of young were taken in Brown, the adjoining eastern county, in 1902.

15. **Vulpes fulvus** (Desmarest).

RED FOX.

Not rare. Professor W. S. Blatchley noted the dens of foxes in Saltpetre Cave, and traces of these animals are not hard to find in many parts of the county.

Bloomington.

16. **Lutreola vison** (Schreber).

MINK.

Rather rare. Most often taken in winter. Traces of them have been observed by W. S. Blatchley in Strong's Cave, and by A. M. Banta in Mayfield's.

Bloomington.

17. **Putorius noveboracensis** Emmons.

WEASEL.

Rare.

Bloomington.

18. **Mephitis mephitis** Schreber.

SKUNK.

Common. Lives in sinkholes and other cavities in the rocks and in burrows of its own making. Dr. B. W. Evermann says that it has the habit of visiting smoke houses. Four young, each eight inches long, were taken June 14, 1892.

Bloomington.

19. **Procyon lotor** (Linn.).

RACCOON.

Common. Every one of the numerous caves in this region has at least one 'coon living in it and evidences of these animals are plentiful along every stream. Mayfield's, Strong's and Truitt's caves are favorite haunts.

Bloomington.

***Ursus americanus** Pallas.

BLACK BEAR.

Extirpated. Wallows and claw marks are still to be seen in Mayfield's, Saltpetre and Eller's Caves. I quote from Professor Blatchley concerning these traces in the latter cave: "We climbed to the entrance of the upper floor, and, passing a short distance within it, found two passages diverging. One to the left, but forty feet in length, ends blindly against a bank of hard clay. Here had been, in days of yore, a bear-wallow, and the marks of bruin's claws were numerous and plainly visible in the clayey walls. The right hand passage proved a long and tortuous one, and had a number of short branches leading from it, one of which showed plainly the evidence of former inhabitancy by bears."*

In the State Geological Report for 1896, the same author presents a letter from Mr. R. M. Hazelett which contains a vivid account of the killing of two bears in a cave about five miles southwest of Bloomington, some time between 1818 and 1824. This is the latest record we have.

20. **Scalopus aquaticus machrinus** (Rafinesque).

MOLE.

Abundant. Some specimens taken are of much larger size than is indicated by the dimensions usually given for the species. Four measuring 170 mm. or more in length were taken in the spring of 1903 (170, 172, 183, and 190 mm. respectively). Young three-quarters grown (156 mm.) were taken May 2, 1903.

Bloomington.

21. **Blarina brevicauda** (Say).

LARGE BLARINA.

Abundant. Found in the same places as deer mice. Not many occur in damp spots. They often eat the deer mice caught in traps and have no scruples against devouring one of their own kind under the same conditions. In confinement they are very voracious. A female which was taken June 15, 1903, with her four young from a nest in a field, ate blue-bottle flies as fast as they could be given to her. On the morning after she was found dead. Many of this species forage in the evenings under the street arc lamps.

Bloomington.

22. **Blarina parva** (Say).

SMALL BLARINA.

Rather rare. Occurs in fields with *Microtus* and *Peromyscus michiganensis*. One was taken under electric light June 2, 1903, and subsequently others were seen at the same place.

Bloomington.

***Corynorhinus macrotis** (Le Conte).

BIG-EARED BAT.

Previously captured in Indiana, five miles southwest of Greencastle in Putnam, the next county north of Monroe, in December, 1894. Two speci-

*Gleanings from Nature. Indianapolis, 1899. p. 114.

mens were seen in a cave.* A new capture is worthy of record. On November 8, 1902, Mr. A. M. Banta took a fine specimen of this bat in the Twin Caves, four miles east of Mitchell, Lawrence County (the adjoining county south). These localities are farther north than this bat had been previously recorded east of the Mississippi.

23. **Lasiurus borealis** (Müller).
RED BAT.

Rather rare. One was taken from a cedar bush April 12, 1903. It was exposed to rain and with the dark streaks and spots made in its russet fur by the drops, its resemblance to a withered leaf caught in the twigs was nearly perfect. Two other specimens were collected.

Stony Spring; Bloomington.

Lasiurus cinereus (Beauvois).
HOARY BAT.

Mr. A. M. Banta contributes the following note on this species: "July 12, 1905. Bloomington, Indiana. During the afternoon a robin chased a specimen of this species out of a tree (?) and after flying some distance, it tumbled down in the driveway. It proved to be a female with two young hanging on. Each young weighed certainly one-third to one-half as much as the old one. In museum of Indiana University." These specimens which were mislaid for a time have recently been recovered, and Mr. W. L. Hahn, formerly of the Division of Mammals, U. S. National Museum, has examined them and confirms the identification.

*Myotis subulatus** (Say).
SAY'S BAT.

This species which has been satisfactorily identified from Brookville and Wheatland, Indiana, has been stated to be the most common bat, by almost all writers on the fauna of the southern part of the State. The result of investigations in Monroe County shakes our faith in this conclusion.

Of four specimens in the University museum which were labeled *subulatus*, two proved to be *M. lucifugus* and two *Pipistrellus subflavus*, which indicates how easily these forms are confused by students remote from good reference collections. Furthermore, not a single bat of this species was collected, though a great number of bats were secured during numerous visits to the caves of the region.

While this negative evidence is not of great value, it is sufficient to cause doubt that *subulatus* is really the most abundant species in southern Indiana. In this connection it is worthy of note that when Mr. Gerrit S. Miller, Jr., revised the Vespertilionidae (N. A. Fauna, 13, 1897), only fifty-three specimens of this form were assembled, while *Myotis lucifugus* and *Pipistrellus subflavus*, the other little brown bats of this area, were represented by 562 and 213 examples respectively.

*A. W. Butler, Proc. Ind. Ac. Sci. 1894, p. 86.

24. **Myotis lucifugus** (Le Conte).
LITTLE BROWN BAT.

This bat, which has been considered abundant is represented by only three specimens, so that its true status is in doubt. W. L. Hahn reports it to be the most common species in Lawrence County, although he agrees with the writer that *Pipistrellus subflavus* occupies that position in Monroe County.

Truitt's Cave, April 12, 1903. Mayfield's Cave, March 27, 1903.

25. **Pipistrellus subflavus** (F. Cuvier).
GEORGIAN BAT.

The material now at hand indicates this species to be the abundant bat of the region. The following specimens are before me:. from Mayfield's Cave, three, March 13, 1903; two, March 27, 1903; four, September 30, 1903, and three, October 3, 1903. From Truitt's Cave, one, April 12, 1903, four undated skins.

Since the Georgian bat has been captured so often in caves, it is probable that the statements made concerning the frequency of bats in these places apply in the main to it. Bats are sometimes found in great masses in the caves in winter but occur there in some numbers at all times of the year. Certain parts of the caves must have been used for long periods to account for the large quantities of bat guano found in some of them, notably Coon's and Eller's, as described by Professor Blatchley.

26. **Vespertilio fuscus** (Beauvois).
BROWN BAT.

Not rare. Has been seen in Mayfield's Cave from December until March. Bloomington, October, 1902.

Following is a list of mammals which have not yet been collected, but whose occurence in Monroe County is probable: Cooper's Lemming Mouse (*Synaptomys cooperi*) which has been taken in Brown County, Jumping Mouse (*Zapus hudsonius*), Gray Fox (*Urocyon cinereoargenteus*), Northern Masked Shrew (*Sorex personatus*) and Silvery Bat (*Lasionycteris noctivagans*).

REPTILES.

The nomenclature of this part of the list is that of Dr. E. D. Cope's report on "The Crocodilians, Lizards and Snakes of North America" (Ann. Rep. Smiths. Inst. (1898) 1900) for the snakes and lizards, and that of Dr. O. P. Hay's "Batrachians and Reptiles of Indiana" (17th Ann. Rep. Dept. Geol. (1891) 1892) for the turtles.

1. **Carphopiops amoenus** (Say).
GROUND SNAKE.

One specimen of the form *helenae*.

2. **Zamenis constrictor** (Linn.).
BLACK SNAKE.

Very common. Vicious, not taming readily in confinement.

3. **Diadophis punctatus** (Linn.).
RING-NECKED SNAKE.

Fairly common.

4. **Cyclophis aestivus** (Linn.).
ROUGH GREEN-SNAKE.

Not an uncommon species; several are seen each year.

5. **Storeria dekayi** (Holb.).

Not rare.

6. **Coluber obsoletus** (Say).
PILOT SNAKE.

Very common. A great climber; of gentle disposition in confinement.

7. ***Natrix kirtlandi** (Kenn.).

One record by Dr. David Starr Jordan.

8. **Natrix fasciata sipedon** (Linn.).
WATER-SNAKE.

Common.

9. **Heterodon platyrhinus** Latr.
HOG-NOSED SNAKE.

The most abundant species. Remarkable for the paroxysms it undergoes when frightened. There is apparently a regular course which must be gone through with when once begun. Usually the head and neck flatten, the body swells and the hissings commence. This part of the series only is often given and seems to be an intimidatory movement. If this does not produce the desired effect, the violent contortions begin immediately. During these the remains of the last meal, if still available for the purpose, are ejected. The writhing continues for a short time and diminishes in intensity until the snake lies perfectly still on its back. I have never observed one of these spasms that reached the contortion stage that was not carried through to the end. They remain in the death feigning posture from a few seconds to many minutes, and the instinct to simulate death is so strongly developed that if the "dead" snake be turned over to the normal position, it is not content to remain inert but at once flops back to what it evidently considers the "deadest" attitude at its command. My experience has been that the young (of the year) come out of this state very quickly, but I have observed an adult when undisturbed to remain in it not less than ten minutes, and Professor W. S. Blatchley found that with a little attention at intervals to remind them of his presence, they would "play possum" for an hour at a time.

10. **Osceola doliata triangula** (Boie).
MILK SNAKE.

Very common. One was found with the tail of a ring-necked snake (*Diadophis punctatus*) protruding from its mouth. It was compelled to disgorge, when its victim was found to be nearly as long as itself. With a little persuasion and assistance it was induced to repeat its feat of deglutition, and was killed. The specimens are now preserved in the University collection as nearly as possible in the position in which they were originally found.

11. **Eutaenia sirtalis** (Linn.).
GARTER SNAKE.

Abundant.

12. **Ancistrodon contortrix** (Linn.).
COPPERHEAD.

Rare.

13. ***Crotalus horridus** Linn.
BANDED RATTLESNAKE.

Recorded as taken recently in Monroe County by Dr. O. P. Hay in 1892. Professor Blatchley wrote in 1899: "At present it is known to occur only in the broken, wooded portions of such counties as Brown, Monroe, and Greene, where there are many ledges of stone, on which in summer, it can bask for hours in the sunlight, and in whose crevices it can find in winter a suitable abiding place."* Probably very rare.

14. **Sceloporus undulatus** Latr.
RAIL-FENCE LIZARD.

Common, and popularly named as here noted from an ordinary habit. Sluggish and easily captured when found in the morning or evening, but very active during the middle of the day. On May 18, 1903, a female captured in Brown County laid more than a dozen rather large eggs.

15. **Cnemidophorus sexlineatus** (Linn.).
SIX-LINED LIZARD.

There is one specimen in the museum from this locality; A. W. Butler reports another, and I have one which was captured in 1901.

16. **Eumeces quinquelineatus** (Linn.).
BLUE-TAILED SKINK.

Common. Occurs in about the same places as *Sceloporus*. On a cool April morning two lizards of this species were found in a pile of boards, which was also inhabited by mice. They were very inactive and easily picked up. In a warm room they quickly recovered their activity and were not slow to nip the fingers of anyone putting a hand into their cage. They readily ate flies and bits of meat.

17. **Trionyx spiniferus** Le S.
SPINY SOFT-SHELL TURTLE.

Occasionally taken in the larger creeks.

18. **Chelydra serpentina** (Linn.).
SNAPPING TURTLE.

Fairly common.

19. **Aromochelys odorata** (Bosc).
MUSK TURTLE.

One taken October 6, 1899, from debris in the cellar of an old school house where according to the label it is supposed to have been buried ten years.

*Gleanings from Nature, 1899, p. 46.

20. **Chrysemys marginata** Agassiz.
WESTERN PAINTED TORTOISE.

The common turtle of the larger creeks.

21. ***Malaclemys pseudo-geographica** (Le S.).
LE SEUR'S MAP TORTOISE.

Recorded by C. H. Bollman.

22. **Malaclemys geographica** (Le S.).
MAP TORTOISE.

A few records.

23. **Cistuda carolina** (Linn.).
BOX TORTOISE.

Abundant. Some box tortoises kept in the laboratory were confined in a tank where they could remain either in or out of the water. They spent quite as much time floating about in the water as they did resting in the dryer parts of the enclosure. They paired here and in the fall laid a number of eggs, some of them in water.

I have frequently found them feeding on mushrooms and have known them to eat potatoes and apples in captivity.

There is much to be learned concerning the reptile fauna of the county. This is especially true with respect to the turtles. In this group the following forms in addition to those listed, probably occur here: *Trionyx muticus* Le S., Spineless Soft-shelled-Turtle; *Kinosternon pennsylvranicum* (Gmelin), Eastern Mud Turtle; *Chrysemys hieroglyphica* (Holb.); *Chrysemys troosti* (Holb.); and *Chrysemys elegans* (Weid).

Among snakes, *Virginia elegans* Kenn.; *Liopeltis vernalis* (De Kay); *Eutaenia saurita* (Linn.) and *Sistrurus catenatus* (Raf.), which have been taken in Brown, the adjoining eastern county, and *Coluber guttatus* Linn. which has been collected in Putnam County (next north) may be expected here. *Natrix leberis* (Linn.), *Natrix fasciata* (Linn.) and *Natrix rhombifera* (Hall.), are species of general range in the State which also may be found.

One lizard, the glass-snake, *Ophisaurus ventralis* (Linn.) in addition to the species included in this list, has been taken both north and south of here in the State, and is no doubt a member of our fauna.

Batrachians.

Monroe County has a rich batrachian fauna. The genus *Ambystoma* is especially well represented, all of the species*

* Excepting the unique *A. copeianum* Hay.

found within the boundaries of the State being known to breed here. In the numerous caves and cave streams the members of the genus *Spelerpes* are abundant, and the other *Plethodontidae* find suitable homes among the rocky hills and valleys. The most noted locality for batrachians is Salamander Pond, a pool about fifty feet in diameter on the summit of a rather high divide less than three miles from the University. In this pond *Ambystoma microstomum*, *jeffersonianum*, *tigrinum*, *punctatum*, and *opacum*, *Diemyctylus viridescens* and several species of toads and frogs breed.

1. ***Necturus maculatus** Raf.

WATER-DOG.

Occasionally seen in the larger creeks.

2. **Ambystoma microstomum** (Cope).

SMALL-MOUTHED SALAMANDER.

This species has been taken a few times about the mouth of Mayfield's Cave and at Salamander Pond.

3. **Ambystoma jeffersonianum** (Green).

JEFFERSON'S SALAMANDER.

A very abundant species. More than one hundred and fifty have been taken at one haul of a net in Salamander Pond. They appear in the pond in January. Eggs have been taken as early as the sixteenth of that month and they are abundant as soon as the ice leaves. The young have been observed transforming in the latter part of July.

4. **Ambystoma tigrinum** (Green).

TIGER SALAMANDER.

Rather rare. A few have been taken from under logs in winter and a very few have been observed at Salamander Pond during the breeding season.

5. **Ambystoma punctatum** (Linn.).

SPOTTED SALAMANDER.

Moderately common. Breeds in several small ponds near Bloomington, including Salamander Pond, and may be found immediately after spawning, under logs and stones in the woods and fields.

6. **Ambystoma opacum** (Gravenhorst).

MARBLED SALAMANDER.

Common. In September and October, this species, with eggs, occurs in Salamander Pond. The nests are cavities in the ground, near the surface, under chunks of wood or the dried crust of algae and other plants. They contain from fifty to more than one hundred and fifty eggs. The larvae may reach a length of an inch while in the egg, but they must have water

to live in while completing their development. Under favorable conditions, they transform in February and March, when they adopt the same mode of life as the adults, occurring most commonly under logs along creeks.

7. **Plethodon cinereus** (Green).

ASHY SALAMANDER.

Abundant. The so-called varieties, *P. c. cinereus*, *P. c. erythronotus* and *P. c. dorsalis*, are all found in this region. The first two occur most frequently, being very common; the last is rare. The form *erythronotus* is generally found under rocks and logs, in comparatively dry situations, along the sides of hills, particularly those with southern exposures. The other varieties, however, are most often found near water, at least, at the foot of the hill slopes. The form *cinereus* has often been taken from under stones on the edge of a creek, and two *cinereus* and one *dorsalis* were secured in Mayfield's Cave.

The above facts indicate that these forms have only partially separated habitats, which would favor the idea that they must be considered merely varieties. Often however, two or more of them are found under the same log, whence it is evident there are no important barriers to their mingling. But, since they associate and since they have been shown to breed true, "adult red-backed specimens watching eggs with red-backed embryos, and brown-backed in charge of brown-backed embryos," according to Cope, what good reason is there against designating them full species?

8. **Plethodon glutinosus** (Green).

SLIMY SALAMANDER.

Rather common under logs and stones in damp situations. One was taken in Mayfield's Cave.

9. **Spelerpes longicaudus** (Green).

LONG-TAILED TRITON.

Rather rare. Has been taken in the woods east of Salamander Pond in October (C. H. Kennedy) and larvae were found at the mouth of a cave (Stony Spring) in May. (James Simonton).

10. **Spelerpes maculicaudus** (Cope).

CAVE SALAMANDER.

Abundant. This pretty species occurs in all caves and cave streams and has been collected at Mayfield's and Truitt's caves, Stony and Leonard's springs, and in Griffy Creek. However, Professor Blatchley found two specimens beneath logs a mile or more from any known cave, and half that distance from streams or springs. I have taken it from under boards and stumps also, and it is seen in cellars, greenhouses and other moist places.

The breeding season is evidently in winter, but larvae are present the year round as the new brood is hatched before the old has transformed. From twelve to fifteen months appears to be the usual period required to complete the development.

11. **Spelerpes bislineatus** (Green).
TWO-LINED TRITON.

Common. One finds this salamander most often along streams, particularly cave outlets. In November they come out of the water and pass the winter under stones and logs near the stream. I once found one under such conditions, with the head cleanly severed from the body, but lying in its natural position not far removed. So far the agent of this skillful decapitation has remained unknown.

Stony Spring, Griffy Creek, Cascades.

12. ***Desmognathus fusca** (Raf.).
BROWN TRITON.

Reported years ago by C. H. Bollman, but not found recently.

13. **Diemyctylus viridescens** Rafinesque.
NEWT.

Abundant. Breeds in all small ponds of the vicinity. The *miniatus* stage has not been noted.

14. **Bufo lentiginosus** Shaw.
TOAD.

Abundant, the variety *americanus* being predominant.

15. **Acris gryllus** (Le Conte).
CRICKET FROG.

Abundant, both varieties, *gryllus* and *crepitans*, occuring here.

16. **Hyla versicolor** Le Conte.
CHAMELEON TREE-FROG.

Abundant.

17. **Hyla pickeringii** (Storer).
PICKERING'S TREE-FROG.

Probably common, few however, being captured.

18. **Rana pipiens** Gmel.
LEOPARD FROG.

Abundant. *Rana p. pipiens* is the common form, but both *sphenocephala* and *brachycephala* have been taken here.

At Harrodsburg, a specimen was obtained that exhibits a duplication of the forearm and hand of the right side, the supernumerary parts being carried in a loop of skin under the throat. (See Am. Nat. XXXV, 1901, p. 33).

19. **Rana palustris** Le Conte.
SWAMP FROG.

Reported by C. H. Bollman. Specimens in museum.

20. **Rana clamata** Daudin.

GREEN FROG.

Common. Sometimes wanders into caves, two specimens being taken in Mayfield's.

21. **Rana catesbiana** Shaw.

BULL FROG.

Common in the larger ponds.

22. **Rana sylvatica** Le Conte.

WOOD FROG.

Rather rare (C. H. Bollman).

In addition to the above mentioned species, the Mud Eel (*Siren lacertina*), the Hellbender (*Cryptobranchus alleghaniensis*), the Scaled Salamander (*Hemidactylium scutatum*), and the Striped Tree Frog (*Chorophilus nigritus*), will probably be found in Monroe County.

Vol. XX, pp. 17-18 February 23, 1907

PROCEEDINGS

OF THE

BIOLOGICAL SOCIETY OF WASHINGTON

A NEW FLYING SQUIRREL FROM THE ISLAND OF TERUTAU, WEST COAST OF MALAY PENINSULA.

BY MARCUS W. LYON, JR.

By permission of the Secretary of the Smithsonian Institution.

Among a collection of mammals from the Island of Terutau, made by Dr. W. L. Abbott, in 1904, there is an apparently undescribed species of Flying Squirrel of the genus *Petaurista*. Pulo Terutau (also written Trotau and Trotto), is a small island lying about fifteen geographic miles off the west coast of the Malay Peninsula, about five and a half degrees north of the equator. The species may be known as

Petaurista terutaus sp. nov.

Type.—Skin and skull of adult male, Cat. No. 123,934, United States National Museum, collected on Pulo Terutau, April 9, 1904, by Dr. W. L. Abbott. Original number, 3219.

Diagnostic characters.—A member of the so-called *nitidus* group, similar to *Petaurista nitidula* (Thomas) of the Natuna Islands, but top of head with a grayish wash, a slight buffy wash over sides of body, and the black on the end of the tail of greater extent.

Color.—Top of neck, back, sides, upper surface of parachute, outer surfaces of fore and hind limbs and base of tail have the general effect of a bright cinnamon-rufous or a bright hazel of Ridgway, clearest and purest on top of neck and along the upper surface of parachute. Most of the hairs have blackish terminal rings, which appear to a considerable extent along the middle of back. Along the sides many hairs have wide, light buffy subterminal rings. Top of head a mixture of whitish and cinnamon-rufous. Sides of head and neck, a color between buff-pink and pinkish buff. Underparts generally, salmon-buff tending toward dull orange-rufous on the parachute. Tail, dull orange-rufous, considerably blackened toward the base and with a blackish apex, 70 to 80 mm. long. Feet, ring about eye, and small area about mouth, blackish. Posterior half of ear blackish; anterior half, dull orange-rufous.

Skull and teeth.—These show no essential differences from those of *Petaurista nitidula.*

Measurements.—External measurements of the type: head and body, 385 mm.; tail vertebrae, 450; hind foot, with claws, 75; weight, 2½ lbs. (1134 grams). Cranial measurements of the type: total length, 64.3 mm.; basal length, 57; basilar length, 53.5; palatal length, 34.2; zygomatic breadth, 43.2; interorbital constriction, 12.4; constriction behind post orbital processes, 16.6; maxillary toothrow (alveoli), 14.2; mandibular toothrow (alveoli), 15.

Specimens examined.—One, the type.

VOL. XX, PP. 19-22 FEBRUARY 23, 1907

PROCEEDINGS

OF THE

BIOLOGICAL SOCIETY OF WASHINGTON

FOUR NEW POCKET MICE.

BY WILFRED H. OSGOOD.

Collections recently made by Nelson and Goldman in Lower California contain a wealth of material in the genus *Perognathus* which has been submitted to the writer for study. The greater part of this material is referable to described forms, the known ranges of which in many cases are thus greatly extended. Three forms appear, however, which need to be characterized, two of them subspecies of *P. penicillatus* and one of *P. spinatus*. A fourth, also here described, is an apparently distinct species of the subgenus *Perognathus* secured by Mr. Goldman during some preliminary work on the east side of the Colorado River in Arizona and Sonora. The types of these forms are in the Biological Survey Collection.

Perognathus bombycinus sp. nov.

Type from Yuma, Arizona, No. 136,123 U. S. National Museum, Biological Survey Collection. ♂ adult. March 18, 1905. E. A. Goldman.

Characters.—Size, color, and general appearance as in *P. p. bangsi*; skull with large, full mastoids and small, nearly square interparietal.

Color.—As in *P. p. bangsi;* upperparts pale vinaceous buff, lightly lined with dusky; ears edged with whitish, a well-developed white spot at anterior base; underparts white.

Skull.—A miniature of that of *P. amplus;* size as in *P. p. bangsi;* mastoids very large and full; parietal border of mastoid with a marked angle between interparietal and orbit; interparietal small and compressed, transverse dimension less than longitudinal; lower premolar larger than last molar.

Measurements.—Type and two specimens from northwestern Sonora, respectively: Total length, 134, 140, 131; tail vertebræ, 79, 82, 77; hind foot, 18.5, 18.5, 18.5. Skull of type: Occipito-nasal length, 20.4; basilar length, 14.5; mastoid width, 11.7; zygomatic width, 9.8; interorbital constriction, 4.4; nasals, 7; interparietal, 2.5 x 2.7; diastema, 5.1; maxillary toothrow, 3.

Remarks.—No external difference appears between this species and *P. p. bangsi*, but cranial distinctions are marked. No evidence of intergradation between the two forms is shown by any specimens yet examined. Speci-

mens from Needles, California, are typical of *bangsi* and in the comparatively short distance between that locality and Yuma no specimens of this group have been taken. Possibly the Colorado River effectively separates the ranges of the two species. *P. bombycinus* is represented by the type and two Sonoran specimens, one from Colonia Lerdo, and one from the Sonora Mesa near the Colorado River twenty miles south of the international boundary. An immature specimen from Trinidad Valley, northwest base San Pedro Martir Mountains, Lower California, may be provisionally referred to this species. Its color is rather dark but its badly shattered skull shows large mastoids.

Perognathus penicillatus siccus subsp. nov.

Type from Ceralbo Island, Lower California, Mexico. No. 146,890 U. S. National Museum, Biological Survey Collection. ♂ adult. February 13, 1906. E. W. Nelson and E. A. Goldman.

Characters.—Size decidedly larger than in *P. p. arenarius;* very weak rump bristles rarely present; color dimorphic, buff phase slightly darker than in *arenarius,* gray phase decidedly different; skull large and heavy; mastoids rather large.

Color.—Buff phase: Practically as in *arenarius* but averaging slightly darker; general effect of upperparts buffy fawn; lateral line narrow, pinkish buff; underparts creamy. Gray phase: Similar to buff phase, but general effect of upperparts ranging from drab gray to broccoli brown.

Skull.—Similar to that of *arenarius* but decidedly larger and heavier; mastoids rather large; ascending branches of supraoccipital broad; similar to that of *ammophilus* but averaging larger with relatively large mastoids.

Measurements.—Average of ten adult topotypes: Total length, 175 (165–187); tail vertebræ, 98 (92–102); hind foot, 24.5 (23.5–26). Skulls of type and one topotype, respectively: Greatest length, 25.9; 26.9; basilar length, 17.7; 18.9; mastoid width, 13.8; 13.8; zygomatic width, 12.6; 13; interorbital constriction, 6.6; 6.6; nasals, 8.9; 9.6; interparietal, 7.2 x 3.6; 7.5 x 3.8; diastema, 6; 6.7; maxillary toothrow, 4; 3.9.

Remarks.—This form was found not only on Ceralbo Island but also at several localities on the neighboring end of the Peninsula. Specimens from the peninsular localities Tres Pachitas and Pescadero seem referable to it, while others from slightly farther north show intergradation with *arenarius.* A series from San Jorge, the type locality of *arenarius,* consists largely of intermediates between *siccus* and a smaller form of the central part of the Peninsula. The type of *arenarius,* however, is decidedly referable to the smaller form and the majority of the topotypes are nearer to it than to *siccus.*

Careful examination reveals a few very weak rump bristles in several specimens of *siccus,* though they are not found in other members of the *penicillatus* series.

Perognathus penicillatus ammophilus subsp. nov.

Type from Margarita Island, Lower California, Mexico. No. 146,859 U. S. National Museum, Biological Survey Collection. ♂ adult. November 29, 1905. E. W. Nelson and E. A. Goldman.

Characters.—Size nearly equalling that of *P. p. siccus;* color paler; mastoids smaller. Size decidedly greater than in *P. p. arenarius;* color averaging paler; skull larger and heavier; mastoids relatively smaller.

Color.—Much as in *arenarius,* but averaging paler; paler than in *siccus,* and not exhibiting a gray phase. General effect of upperparts ecru drab; basal part of hairs of upperparts pale gray (Ridgway, Pl. II, No. 9) slightly tinged with fawn; no obvious lateral line; underparts creamy.

Skull.—Similar in general to that of *siccus,* but mastoids smaller; larger and heavier and with relatively smaller mastoids than that of *arenarius.*

Measurements.—Average of nine topotypes: Total length, 181 (171–188); tail vertebrae, 105 (100–113); hind foot, 24 (23.5–25.5). Skull of type: Greatest length, 26.1; basilar length, 18; mastoid width, 13.2; zygomatic width, 13.1; interorbital constriction, 6.6; nasals, 9.4; interparietal, 7.3 x 3.8; diastema, 6.4; maxillary toothrow, 3.8.

Remarks.—This form may be distinguished from both *arenarius* and *siccus* by its relatively small mastoids. Specimens from Magdelena Island, which lies near Margarita Island, do not approach this form in size or cranial characters, but, though rather pale, seem referable to *arenarius,* the color of which is subject to local variation.

Perognathus spinatus magdalenae subsp. nov.

Type from Magdalena Island, Lower California, Mexico. No. 146,102 U. S. National Museum, Biological Survey Collection. ♀ adult. November 25, 1905. E. W. Nelson and E. A. Goldman.

Characters.—Size and color nearly as in *P. s. peninsulae;* mastoids smaller; rostrum slightly longer. Mastoids as in *P. s. margaritae;* size smaller; rostrum longer and broader.

Color.—Practically as in *peninsulae* and *margaritae,* but somewhat more deeply vinaceous; upperparts fawn color mixed with dusky chiefly disposed as fine lines; lateral line very narrow, fawn color; underparts creamy white.

Skull.—Size about as in *peninsulae;* mastoids smaller; rostrum slightly longer; mastoids as in *margaritae;* rostrum, nasals, and skull throughout more elongate.

Measurements.—Average of ten topotypes: Total length, 194 (188–200); tail vertebræ, 115 (110–122); hind foot, 24 (23.5–25). Skulls of type and one topotype, respectively: Greatest length, 26.4; 26.8; basilar length, 17.9; 18; mastoid width, 12.6; 12.7; zygomatic width, 12.8; 12.7; interorbital constriction, 6.9; 6.7; nasals, 10.5; 10.6; interparietal, 8.1 x 3.6; 7.5 x 3.3; diastema, 6; 6.5; maxillary toothrow, 4.3; 4.

Remarks.—This is a slight form which, but for its insularity, might be overlooked. It differs from *peninsulae* and agrees with *margaritae* in the small size of the mastoids. In the light of extensive material from the Peninsula, it appears that this form and also the previously described insular forms *P. s. margaritae* and *P. s. bryanti* should be considered only as subspecies, for, though the insular forms are constant in character, variation among mainland specimens is considerable.

Vol. XX, pp. 23-28 March 27, 1907

PROCEEDINGS

OF THE

BIOLOGICAL SOCIETY OF WASHINGTON

SOME UNRECORDED COLORADO MAMMALS.

BY MERRITT CARY.

Fifteen species of mammals collected in the course of explorations conducted by the Biological Survey in Colorado have not been hitherto recorded from that State, and authentic evidence of the occurrence of two additional species has also been obtained for the first time. Most of these additions to the Colorado mammal list were made in the field seasons of 1905–06, during which a detailed survey was made of the region north of Grand River, extending from the plains at the eastern base of the foothills in Jefferson, Boulder, and Larimer counties, westward to the Utah line. The additions are briefly recorded in the present paper, together with notes on the ranges of three other little-known Colorado mammals, pending a complete report when a thorough survey of the distribution areas of the State shall have been completed.

For the privilege of publishing the following records, all but two of which are based on specimens in the collection of the Biological Survey, my thanks are due Dr. C. Hart Merriam.

Sciurus aberti mimus Merriam.

Vernon Bailey reports this handsome squirrel as common in the eastern foothills of the San Juan Mountains, 10 miles west of Antonito, Conejos County, where it inhabits the yellow pine forests.

Eutamias dorsalis utahensis Merriam.

Early in September, 1906, fifteen specimens of this beautiful gray chipmunk were collected in the dense cedar and piñon breaks near Douglas Spring, at the north base of the Escalante Hills, in western Routt County. A few were taken among the yellow pines as high as 7,000 feet, but they were most abundant on the north slopes of the Escalantes, at about 6,400 feet.

This chipmunk was described from Ogden, Utah, and has not been taken previously much east of Provo, in that State. It is largely an Upper

Sonoran form, and probably ranges continuously across northeastern Utah along the southern foothills of the Uinta Mountains, entering Colorado in the region of the Yampa Plateau, south of Bear River. I was surprised to find it absent from the piñon-covered ridges on either side of the lower White River Valley.

Eutamias minimus (Bachman).

Chipmunks from the sage plains of the lower Snake River Valley and Browns Park, in western Routt County, agree perfectly with typical specimens of *E. minimus* from Green River, Wyoming. Three males and one female were collected in 1906, at the following localities: Snake River (15 miles northeast of Sunny Peak), August 24; Snake River (south of Sunny Peak), August 28; Ladore (Browns Park), September 3. Towards the mountains on the south and east, *minimus* grades into the dark form *consobrinus*, specimens from Lay, Axial Basin, and Lily being intermediate in coloration.

Eutamias minimus consobrinus (Allen).

This is the small, dark chipmunk so abundant on all the higher plateaus and mountains west of the Front Range, and north of Grand River. It is chiefly an inhabitant of the Canadian and Transition zones, and in the eastern part of its range is the only chipmunk present over a large area. On some of the western plateaus, however, *E. consobrinus* ranges down a short distance into the cedar and piñon belt of the Upper Sonoran zone, and there commingles with the large Hopi chipmunk (*E. hopiensis*).

E. consobrinus is represented by a large series in breeding and fresh post-breeding pelages, and a few in the early winter coat. Specimens were secured at the following localities: Middle Park (Coulter, Sulphur Springs, Mount Whiteley); North Park (Arapahoe Pass, Canadian Creek, Pearl); Slater (20 miles southeast); White River Plateau (25 miles southeast of Meeker); Meeker; Rangely; Gypsum; and Baxter Pass (Book Plateau).

Four chipmunks in the National Museum, collected by Capt. Bowman at old Fort Massachusetts (near the present site of Garland), have been recorded as *E. consobrinus*.* These are faded flat skins which were made up with the skulls inside. The skulls have been removed and cleaned through the courtesy of Dr. M. W. Lyon, Jr., and are found to be larger and more robust than skulls of typical *consobrinus*. A comparison with the skull of the type of *Eutamias amoenus operarius* from Gold Hill, Boulder County, proves that the Fort Massachusetts chipmunks are properly referable to that species.

Eutamias amoenus operarius Merriam.

Eutamias amoenus operarius Merriam, Proc. Biol. Soc. Wash., XVIII, p. 164, June 29, 1905. Type from Gold Hill, Boulder County, Colorado.

This chipmunk is most abundant in the boreal zones on the eastern slope of the Front Range, but is found as low as 6,500 feet at several localities in the eastern foothills. It ranges far above timber line, and across

*Allen, Bull. Am. Mus. Nat. Hist., III, p. 113, 1891.

the Front and Medicine Bow ranges to Coulter (Middle Park), and Canadian Creek (North Park), where its range meets and slightly overlaps that of *consobrinus*, of the western Colorado mountains. In color, *operarius* is not unlike *consobrinus*, but it may be readily distinguished by its more robust skull. Five skulls of adult male topotypes of *operarius* measure: Occipito-nasal length, 32; basilar length, 24.6; zygomatic breadth, 18. Four skulls of adult male *consobrinus* from Canadian Creek, North Park, measure: Occipito-nasal length, 31; basilar length, 23.5; zygomatic breadth, 17.2.

Specimens of *operarius* are in the Biological Survey collection from the following localities: Gold Hill, Estes Park, Longs Peak, Boulder (5 miles west), Nederland, Golden, Idaho Springs, Fort Garland, Antonito, Lake City, Silverton, Mount Kelso, Elkhorn, Livermore, Berthouds Pass, Canadian Creek and Coulter.* Specimens taken in the vicinity of Colorado Springs, and at Crested Butte, have been identified for E. R. Warren of Colorado Springs.

Citellus tridecemlineatus parvus (Allen).

This small spermophile is generally distributed over the desert areas of western Routt and Rio Blanco counties. It was noted on Snake River, 30 miles northeast of Sunny Peak, August 22, 1906, and specimens were secured at Escalante, August 31, and Rangely, September 13 and 17. It was reported common in Lily Park, at the confluence of Snake and Bear rivers; in Browns Park, near the Utah line; and on the Iron Springs Divide, between Snake and Bear rivers. In 1905, two immature specimens were collected in the Axial Basin, Routt County, August 8, and an adult male at Mud Springs, on the White River Plateau, 30 miles southeast of Meeker, August 18. The altitude of Mud Springs is 9,000 feet. J. Alden Loring collected three of these spermophiles at Fort Garland in July, 1892, while more recently, August 30 and 31, 1904, J. H. Gaut secured two more at Antonito, Conejos County.

Onychomys brevicaudus Merriam.

This short-tailed grasshopper mouse is common on the sage plains of North Park, and in the region between Snake and Bear rivers, in western Routt County. It is represented by a series of eight July and August specimens, taken at the following localities: Canadian Creek, east of Walden, North Park; Snake River, south of Sunny Peak, Routt County; Bear River, south of Lay.

A specimen collected by W. W. Granger at the forks of Snake River, near Honnold, Routt County, September 1, 1895, is recorded by Allen. †

Neotoma desertorum Merriam.

This desert wood rat apparently enters Colorado from the Utah deserts only in the extreme lower White River Valley. Four specimens were collected five miles west of Rangely, September 15 and 16, 1906. It was

* Both *operarius* and *consobrinus* have been collected at Coulter and Canadian Creek.

† Bull. Am. Mus. Nat. Hist., VIII, p. 253, 1896.

not at all common, but a considerable number of nests were found on the cactus-covered bench, or table, on the south side of White River, at 5,300 feet.

Reithrodontomys megalotis (Baird).

A series of twenty-six harvest mice from Grand Junction are referable to this species. All but one were collected by A. H. Howell, early in November, 1895, and are in early winter pelage. The other specimen, secured by E. A. Preble, August 25 of the same year, is in the bright, fulvous summer coat.

Microtus (Lagurus) pauperrimus (Cooper).

Several ill-defined runways, and other evidences of a small species of *Microtus*—presumably a *Lagurus*—were detected on the sage plains in the eastern part of North Park in July, 1905. During the same month, three specimens were trapped in the sand hills at the west base of the Medicine Bow Mountains, east of Walden. In August and September, 1906, fourteen specimens of this species were collected at the following localities: Canadian Creek, east of Walden, North Park; eight miles south of Lily, Routt County; four miles east of Toponas, Egeria Park. The bleached anterior portion of a skull was found in a wood rat's nest near Douglas Spring, at the north base of the Escalante Hills. The species may have a general range over the sage plains of northwestern Colorado, but thus far has been found only in widely separated colonies between 6,000 and 8,500 feet altitude.

Doctor Allen has recorded the species from Kinney Ranch, Sweetwater County, Wyoming, * within 30 miles of the Colorado line.

Thomomys clusius ocius Merriam.

This is the pocket gopher of the sage plains of western Routt and Rio Blanco counties. It is represented in the Biological Survey collection by eight August and September specimens, from the following localities: Bear River, south of Lay, Routt County; Snake River, 15 miles northeast of Sunny Peak; Ladore, Browns Park; Elk Springs, 8 miles south of Lily; and Lily. Part of a weathered skull was found at Douglas Spring. The high escarpment of the Book Plateau probably forms the southern boundary of the dispersion of this species.

Thomomys aureus pervagus Merriam.

Eight specimens from Antonito, and two from Conejos River, in the southern part of the San Luis Valley, collected in September, 1904, accord well with this form, the type locality of which is Espanola, Santa Fe County, New Mexico. The altitude of Antonito is a little over 8,000 feet.

Thomomys fulvus (Woodhouse).

A specimen of this species from Fisher Peak, southeast of Trinidad, Las Animas County, was collected by A. H. Howell, September 15, 1903, at an elevation of 8,000 feet.

*Bull. Am. Mus. Nat. Hist., VIII, p. 248, 1896.

Perodipus longipes (Merriam).

The Moki kangaroo rat is tolerably common in the desert part of the lower Grand Valley, from the Utah line east at least to Grand Junction. A fine male was collected three miles northwest of Fruita, Mesa County, September 27, 1906. Four immature specimens from Grand Junction are also in the Biological Survey collection.

Perognathus apache Merriam.

A pocket mouse collected on the sandy desert three miles northwest of Fruita, Mesa County, September 28, 1906, is referable to this species. Another specimen, taken at Balzac, west of Rifle, Garfield County, October 4, 1906, is much larger, but of similar coloration, and its affinities are clearly with *apache*.

(?) **Perognathus callistus** Osgood.

Numerous signs of a small or medium sized pocket mouse were noted in bunches of prickly pear (*Opuntia polyacantha*), in the valley of Snake River, a few miles southeast of Sunny Peak, in August, 1906. Specimens were not secured, owing to the extreme abundance of white-footed mice. The Snake River pocket mice are tentatively recorded as *P. callistus* because of their proximity to the type locality, Kinney Ranch, Sweetwater County, Wyoming, which is only 40 miles to the northwest. No other evidences of pocket mice were observed north of the Grand River Valley.

Spilogale gracilis saxatilis Merriam.

The little spotted skunk is generally reported from the warm desert valleys entering Colorado from the west. Sunny Peak, Routt County, seems to be the eastern limit of its dispersion in the Snake River Valley; while it is common at Rangely, on White River; and in Lily Park, at the confluence of the Snake and Bear rivers. In the Grand Valley the spotted skunk probably occurs as far east as Glenwood Springs, since Mr. Fred Baker, a taxidermist of that place, reports that he has recently handled several skins taken between Newcastle and Glenwood Springs.

A male specimen from Grand Junction (collection Biological Survey, November 3, 1895, A. H. Howell), and one from Coventry, Montrose County, taken in 1906 (collection E. R. Warren), have been recorded recently as *saxatilis*.*

Myotis californicus (Aud. and Bach.).

In his recently published list of Colorado mammals,† E. R. Warren includes this species on supposition, without citing actual records of capture. A specimen in the Biological Survey collection from the southern end of the San Luis Valley shows that this bat reaches extreme southern Colorado. It is an adult male, and was taken 7 miles east of Antonito, Conejos County, September 1, 1904, at 8,000 feet.

* N. Am. Fauna No. 26, p. 24, 1906.

† Mamm. Colo., 1906.

Myotis californicus ciliolabrum (Merriam).

Two female bats collected at the old L 7 ranch on Snake River, a few miles southeast of Sunny Peak, Routt County, August 28 and 29, 1906, are referable to this pale form of *M. californicus*. They were caught in the deserted ranch buildings after nightfall.

Myotis yumanensis (H. Allen).

This pale, southwestern species is represented by two females from Snake River, south of Sunny Peak, Routt County, August 28, 1906; and a male taken near Lily, at the confluence of the Snake and Bear rivers, September 9, 1906.

VOL. XX, PP. 29-30 MARCH 27, 1907

PROCEEDINGS

OF THE

BIOLOGICAL SOCIETY OF WASHINGTON

MARINE BIO

A NEW RACE OF THE HEPATIC TANAGER.

BY OUTRAM BANGS.

Since first described by Swainson in 1827;* *Piranga hepatica* has never been divided into subspecies. There are, however, two very well marked geographic races of this tanager, one a large, dull-colored bird ranging from the table lands and surrounding mountains of southwestern Mexico north to Arizona and New Mexico, the other, smaller and much more intensely colored, occupying the mountains of eastern Mexico from Vera Cruz north to Nuevo Leon.

Swainson gave the type locality of his *Piranga hepatica* as "Real del Monte, Hidalgo," which Mr. E. W. Nelson tells me is Temescaltipec, Mexico, of recent maps. There are no skins available from this immediate place, but numerous specimens in the Biological Survey collection from localities in the same general region are all referable to the ordinary large, dull-colored form, which, moreover, Swainson's description ("Grayish livid, beneath bright red, t. l., 8; bill, $\frac{3}{4}$; wing, 4; tail, $3\frac{1}{2}$; tarsi, $\frac{3}{4}$"), brief as it is, seems to indicate. The new form is therefore that of eastern Mexico.

The differences in color between the two races of *Piranga hepatica* are much like those that separate the eastern from the western form of *Piranga bidentata*, and the pale and dark race of each species has in part the same geographic distribution, *Piranga bidentata bidentata*, the pale western race, occurring with *Piranga hepatica hepatica*, the pale race of that species in Mexico and adjacent States, and *P. bidentata sanguinolenta* occupying the same region with *P. hepatica dextra*, both richly colored races, in eastern States from Nuevo Leon to Vera Cruz.

The new form of the hepatic tanager may be known as

* Philo. Mag., New Series I, p. 438, 1827.

Piranga hepatica dextra subsp. nov.

Type.—From Jalapa, Vera Cruz, Mexico, adult ♂, No. 2090, coll. of E. A. and O. Bangs. Collected April 18, 1897, by C. B. Isham.

Characters.—Similar to true *P. hepatica*, but smaller; the adult ♂ much more richly colored; back much redder, less grayish; pileum darker, more intense red—dull scarlet—vermilion; under parts, darker, deeper red—deep orange—vermilion (flame-scarlet in true *P. hepatica*). Adult ♀ darker in color throughout with the back decidedly less grayish.

Measurements.—*Type*, adult ♂, wing, 96.; tail, 74.5; tarsus, 23.; culmen, 18.5.

VOL. XX, PP. 31-32 MARCH 27, 1907

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AN OWL, *RHINOPTYNX CLAMATOR* (VIEILL.), ADDED TO THE COSTA RICAN ORNIS.

BY OUTRAM BANGS.

With a collection of birds made in another part of Costa Rica that will be reported upon later, Mr. C. F. Underwood sent Mr. John E. Thayer and me a fine adult male of the South American eared owl, *Rhinoptynx clamator* (Vieill.).

The specimen, now No. 17501, Coll. of E. A. and O. Bangs, in splendid condition of plumage, was taken in the vicinity of San José, Costa Rica, in January, 1906.

This is, I believe, the first record of the appearance of this owl in Costa Rica. One or two specimens were taken by McLeannan in Panama and one by Arcé in Veragua, which seem to be the only other recorded instances of its capture north of South America.

This species used to be called *Asio mexicanus* (Gmel.). Messrs. Salvin and Godman have, however, shown that the Mexican eared owl of Latham, on which the name was based, is not identifiable, and that the *Bubo clamator* of Vieillot is undoubtedly the first applicable name of the species. Most ornithologists, Kaup and Ridgway excepted, up to the present time (even Sharpe in Hand List of Birds), have associated this owl with the long-eared and short-eared owls, putting it in the genus *Asio* (=*Nyctalops*), according to the views of Stone and of Oberholser, *Asio* being properly the name of the great horned owls. But here also I see trouble ahead, because *Nyctalops* has as its type the peculiar species *stygius* which, with its huge bill, short wing, and other peculiarities can hardly be considered as congeneric with the long-eared owls and the short-eared owls.

In 1852 Kaup made a special genus, *Rhinoptynx* for *Asio mexicanus*.

Ridgway in 1875 gave it as his opinion that the bird was "a typical *Bubo*, although usually referred to the genus *Otus*." Salvin and Godman, in Biologia Centrali-Americana, refer to Ridgway's remarks, but again place the species in the genus *Asio*.

Rhinoptynx clamator certainly bears a strong superficial likeness to the long-eared owls, and the character of its plumage is the same, and not like that of the great horned owls. Otherwise it is very different, having very short wings and large feet, and while Ridgway may be right in considering it a "typical *Bubo*," its general unlikeness to the great horned owls has induced me to follow Kaup in placing it in a genus by itself.

VOL. XX, PP. 33-40 MARCH 27, 1907

PROCEEDINGS
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SOME NEW WESTERN PLANTS AND THEIR COLLECTORS.

BY AVEN NELSON.

Relatively speaking there are a considerable number of men who are interesting themselves in the flora of the Rocky Mountains. These mountain fastnesses still possess miles upon miles of untouched area so far as botanical work is concerned. Some of the collectors are at work merely for the personal pleasure they get out of the field work and from this contact with nature in a region still largely unchanged by the encroachments of agriculture upon it. Besides these enthusiasts there are others who represent also the interest of the educational institutions of this part of the world. It may be interesting to know something of the work and location of all of these. There is no attempt here to give a complete list, mention being made merely of those with whom the writer has recently come into contact in connection with the work that he is endeavoring to do at the Rocky Mountain Herbarium.

Dr. P. B. Kennedy, of the University of Nevada at Reno, is very assiduously at work upon the plants of the Great Basin and of certain other more restricted localities in his State. He is making a special study of certain groups and will be heard from when such studies shall have been completed.

What Dr. Kennedy is doing for Nevada, Dr. Francis Ramaley, with his corps of assistants, of the University of Colorado, at Boulder, is doing for his State. Some very interesting ecological studies have been made not only by Dr. Ramaley but also by Dr. T. D. A. Cockerell of that institution. The latter, though professedly an entomologist, is known almost as well for his general studies in science and particularly for his discriminating observations and publications in botanical lines. Their collections during the past season were unusually extensive and varied.

In Utah we have a school man in the person of A. O. Garrett, the science teacher in the Salt Lake High School, who is well known among botanists because of his collection and distribution of the parasitic fungi of his State. He has also made extensive collections of the seed plants and many species of interest, as well as some novelties, are thus being made known.

New Mexico has for many years been a land of great interest. Prof. E. O. Wooton and his co-workers are finding it so to-day. The Agricultural College, at Mesilla Park, is getting together a collection that will need to be studied by anyone who would know the flora of that region.

Professor Elias Nelson, whose excellent work upon the two genera *Phlox* and *Antennaria* has not been forgotten, is at work in Idaho. While he is not now engaged professionally in botanical work, he has lost none of his interest in it. Always alert to the best things about him, he is gradually accumulating some choice examples of the Idaho plants. Though connected with the Experiment Station at Moscow, his address for the present is at Twin Falls.

One naturally expects that the men who are connected with educational institutions will show a degree of interest commensurate with the work for which their departments stand. Pleasing as this is, it is perhaps more gratifying to see that the interest of those who are engaged in other lines of work is scarcely less than that of the professional botanists. Among this latter class I wish to mention the following:

Mr. J. Lunell, M. D., of Leeds, North Dakota, though his professional duties demand much time, has found the leisure for studying his flora in a most critical way and of substantiating his studies by very excellent specimens.

It is well known that Mr. George E. Osterhout is a careful, systematic botanist, as is attested by his papers published from time to time. It is perhaps not so well known that his plant studies are his recreation and that his main business is a commercial one in the little town of New Windsor, Colorado, where he has resided for many years.

Colorado has yet another collector in Mr. Earl L. Johnston who seeks out the unvisited nooks in the Colorado mountains and brings back some of the choice things that are there produced. Mr. Johnston's home is at Evans, Colorado.

Colorado has been the collecting ground for scores of tourists during the last quarter century, but even so, it is quite likely that her flora is still only partially known. Among those who occasionally go to the West to spend a summer's vacation in the delightful work of collecting, one should mention Mr. W. S. Cooper, of Detroit, Michigan (at present at Johns Hopkins). For several years past some portion of his summer's vacation has been spent in the Rocky Mountains of Colorado, Utah or Wyoming.

Several of the men mentioned above have kindly shared their plants with the writer, who has found much pleasure in joining these collectors in their studies. As a result of these studies it has seemed necessary to designate certain specimens as new species. The descriptions of these proposed species are offered below. The types are all deposited in the Rocky Mountain Herbarium.

Fritillaria lunellii sp. nov.

Bulb of many rather thin scales, 6–12 mm. long: stem slender, 2–4 dm. high: leaves 4–6, distributed in one of the following ways,—all in one verticil; all but one in the verticil; or in two verticils of 2–4 leaves each;—the lowest leaves always above the middle of the stem, broadly linear-lanceolate or oblong-lanceolate, tapering gradually to the obtusish apex, 3–4 cm. long: floral bract similar to the leaves but smaller (2–3 cm. long): peduncle rather slender, 7–12 cm. long: flowers one (rarely two), drooping on short slender pedicel: perianth segments narrowly oblong or oblong-lanceolate (in shape much like the leaves), obtusish, 2–3 cm. long, twice as long as the slender filaments, dark-purple on the ontside, purple mottled with yellow within: anthers large, oval: style cleft only one-third its length or less: the thickened linear stigma somewhat recurved: capsules* pyriform or broadly obovoid, about 15 mm. long, smooth, furrowed rather than angled at the sutures.

I feel that it is only fitting to name this in honor of its discoverer, who has not only supplied me with the specimens but has pointed out many of the characters given above. Type bears the accession No. 56,200. It was collected in the timbered foothills of Mount Hood, Wasco Co., Oregon, by J. Lunell, M. D., of Leeds, North Dakota.

Roripa pectinata sp. nov.

Glabrous winter annual, with vertical taproot, most of the plants branching freely, beginning to blossom when quite small but in fruit 1–3 dm. high: winter crown leaves small, oblanceolate, from entire to pectinately toothed, withering early: those of the stem and branches larger, 2–6 cm.

*There is a possibility of error as to the capsule since the single fruiting specimen was secured at another time.

long, mostly oblanceolate in outline but deeply pectinately toothed or lobed: the yellow flowers small and crowded but the naked racemes in fruit stout and half the length of the plant: sepals oval, yellowish with membranous margins, slightly exceeding the oblong-spatulate petals: silique broadly linear, abruptly pointed by the almost sessile stigma, slightly curved, 12–16 mm. long, ascending, on divaricate pedicels less than half as long as the silique: seeds rather large, pale, crowded, minutely impressed punctate.

Most nearly allied to *R. curvisiliqua* (Hook.) Bessey which differs from this in being minutely pubescent or subscabrous, with petals exceeding the sepals, siliques falcate and linear, somewhat torulose, and the seeds small, smooth and somewhat triquetrous.

The leaves in young plants of the species now proposed are strikingly pectinate, the linear lobes either entire or with a few linear teeth. This species blossoms very early in the season and is in full fruit by May first in the type locality. Its ally comes into blossom and fruit much later in the season (June and July). Collected at The Dalles, Oregon, by Dr. J. Lunell, April 12 and April 16, 1903. The latter is the type and is deposited under the accession No. 54,984. Secured again by the same collector, in mature condition, May 4, 1906, at the type station.

Sidalcea sylvestris.

Perennial from a rhizome which is sometimes thickened and corm-like: stems more or less clustered, mostly simple, slender, 5–10 dm. high, green, inconspicuously and very sparsely pubescent below with short forked hairs, the inflorescence minutely stellate: leaves nearly or quite glabrous, the slender petioles somewhat hirsute with branched hairs: radical leaves 5–7 lobed, divided or parted, each lobe mostly 3-toothed: stem-leaves palmately 5–7 foliate: leaflets linear, with conspicuous midnerve, 7–12 cm. long, 6–10 mm. broad, tapering gradually to the acute ends: bracts paired, linear, shorter than the pedicel, the lower sometimes accompanied by a long, narrowly linear leaf: raceme simple, slender, at last quite open: calyx-lobes triangular-lanceolate, fully as long as the campanulate tube: petals spatulate-oblong, 15–18 mm. long, twice as long as the calyx, of a delicate pale lavender color: mature fruits not at hand.

Allied in some ways to both *S. campestris* and *S. Oregana* Greene. The collector, Dr. J. Lunell, surmised that it might be a hybrid, but it does not seem to the writer to have enough of the characters of either to warrant that conclusion. It is a woodland species secured near Wheatland, in Yamhill Co., Oregon. The type bears the accession No. 52,562.

Zaushneria garrettii sp. nov.

Caudex with slender woody branches: stems several, simple, slender, erect from somewhat decumbent bases, 1.5–3 dm. high, with pale glabrous shreddy bark below, upward greener and softly hirsute, the hairs long and widely spreading: leaves sessile, crowded, elliptical, oval or ovate, 2–3 cm. long, the margin with small rather remote and irregular teeth, green but sparsely soft-hirsute, venation pinnate, the primary veins few

the secondary veins obscure or indiscernible: flowers few, in a terminal crowded cluster: calyx pubérulent, its tube deep-red, 12–16 mm. long, cylindric, with slightly dilated base and throat, lobes half as long, greenish, triangular-lanceolate, callous tipped: petals thick, deep-red, obovate-cordate, slightly exceeding the calyx-lobes: stamens barely exserted; pollen grains unusually large: stigma tardily well exserted: ovary and capsule minutely glandular-pubescent on the angles.

This species belongs in the *Z. latifolia* group but can scarcely be confused with the typical Californian form of that species.

Secured by A. O. Garrett, August 28, 1906, in Big Cottonwood Canon, Salt Lake County, Utah; type No. 2031.

Mertensia micrantha sp. nov.

Stems clustered, spreading, 2–3 dm. long, rather slender, glabrous or nearly so: leaves dark green and seemingly glabrous but under a lens minutely appressed-hispid on both sides, not pustulate, 3–7 cm. long; the uppermost lanceolate, more narrowly so downward where they become smaller and linear: panicle leafy, many-flowered; flowers small; calyx about 3 mm. long, its lobes linear-lanceolate, ciliate-margined, longer than the campanulate tube; corolla about 10 mm. long, its limb as long as the tube, narrowly campanulate, with short suborbicular lobes: the stamens inserted in the throat and reaching to the lobes; the filaments as broad or broader than the anthers and nearly as long: style equalling the stamens.

This seems to be a good species in the *Lanceolatae* and not very nearly allied to any of the described species.

It was secured by Dr. Francis Ramaley and Mr. W. W. Robbins, on Sugar-loaf Mountain, July 14, 1906. Type No. 1750.

Douglasia johnstoni sp. nov.

A depressed perennial, the caudex with few, slender, naked branches not rising above the soil, each branch terminating in a close rosulate cluster of leaves less than 1 cm. high and broad: leaves minute, 3–6 mm. long, closely imbricated, glabrous except for a sparse marginal fringe of white ciliae, mostly oblong, subacute, somewhat keeled: peduncles rising singly from the center of each rosula, sparsely ciliate-hirsute as is also the inflorescence: 8–10 mm. long: umbel crowded, few-flowered (3–8): bracts lance-linear, as long as the pedicel and calyx: pedicels nearly equal, very short: calyx campanulate, its lobes lanceolate, subacute, as long as the tube: corolla-lobes oblong obovate, as long as the tube, reflexed and withering-persistent over the distended tube: stamens inserted just above the middle of the tube, the large anthers extending to the narrowed orifice of the throat: capsule sessile, globose.

This well marked species I believe is the first *Douglasia* reported from Colorado. It was secured by Mr. Earl Lynd Johnston, August 16, 1906, near the foot of Mt. Washington, on the trail to Chasm Lake, Long's Peak. It bears the No. 339.

Coleosanthus garrettii sp. nov.

Apparently tufted, with several assurgent herbaceous stems, leafy, bright green and glabrous (a minute puberulence under a good lens): leaves very thin, from very broadly to narrowly triangular-ovate, mostly irregularly and sharply dentate, acute at apex, the base cuneate, rounded, truncate or subcordate on the same stem, 4–8 cm. long, on slender petioles 1.5–3 cm. long: heads on slender ascending branchlets from the uppermost axils, few-several in each cluster, on slender pedicels 8–15 mm. long: involucres campanulate, 10–14 mm. high, subtended by a few linear or acuminate bractlets; the bracts in 3–4 series, greenish, with about 5 pale nerves, scarious-margined, obtuse or abruptly acute, nearly glabrous: achenes brown, glabrous or nearly so, finely ribbed.

This species is dedicated to the diligent student of the Utah flora, the teacher of botany in the Salt Lake City High School, Mr. A. O. Garrett. The type is No. 1061, from City Creek Canon, Salt Lake County, Utah, August 5, 1904.

Machaeranthera latifolia sp. nov.

Perennial from woody roots and short branched caudex: stems few-several, slender, erect, 1.5–2.5 dm. high, minutely puberulent: leaves minutely puberulent (the upper face nearly glabrous), mostly entire, rarely with a few small spinulose teeth, generally 3-veined from the base and somewhat reticulate above: the basal and lower stem leaves from broadly oblanceolate to obovate, 2–3 cm. long, tapering into a short, narrowly margined petiole; the upper stem leaves sessile or nearly so, those of the inflorescence reduced and becoming bract-like: heads few, corymbose, relatively large, 8–14 mm. high: involucre campanulate, its bracts in 5–6 series, oblanceolate or oblong-lanceolate, the dark-green acute or acuminate tips ultimately reflexed, minutely glandular puberulent (the peduncles puberulent but scarcely glandular): rays blue with a slight violet tinge: achenes sparsely and obscurely pubescent, shorter than the pappus.

This species has been under observation by Mr. Garrett for two years. It is represented by his Nos. 1933 and 1594 as type and co-type respectively, one collected in August, 1905, the other in August, 1906, in Big Cottonwood Canon, Salt Lake County, Utah.

Machaeranthera paniculata.

A perennial allied to the preceding: stems several, slender, erect, 4–8 dm. high, with branching paniculate inflorescence, minutely puberulent throughout, somewhat glandular-viscid on the tips of the involucral bracts only: leaves bright green, from oblanceolate to oblong-linear, 3–6 cm. long; all the lower tapering to margined petioles: the upper nearly sessile and passing into the gradually narrowed and reduced foliar bracts: bracts numerous, linear, the uppermost subulate: rays of the panicle with 1–3 heads: involucre turbinate, 10–14 mm. high; its bracts in 5–7 series, linear, very pale (white), terminated by a dark-green, viscid reflexed tip: rays

long, slender, blue or purple-tinged: achenes broadly linear, with minute sparse pubescence.

This handsome conspicuous species was collected by Mr. Garrett on the mountains of Parley's Canon, Utah, September 13, 1906. Type No. 2083.

Antennaria solstitialis J. Lunell sp. nov.

Stems slender, floccose-woolly, 5–12 cm. high, surculose, broadly tufted: stolons 1–3 cm. long: leaves silvery appressed-pubescent on both sides: the basal oblance-spatulate, 5–6 mm. long; the stem leaves with looser pubescence, 8–14 mm. long: heads 5–7, in a glomerate capitate cluster; involucre 4–5 mm. high, obconical or campanulate, each head with a linear-acuminate bract as long or longer than the head; involucral bracts from oblong (exterior) to suborbicular (within).

In the type locality it comes into blossom late in June, and occurs sparingly in dry, sunny situations. The other species occurring there are *A. aprica* Greene, which blossoms two weeks earlier, and *A. campestris* Rydb. which is four weeks earlier. *A. microphylla* Rydb. also occurs, but from that species, its nearest relative, *A. solstitialis* differs in its smaller leaves, shorter stolons, the congested inflorescence, and the scarcity of pistillate plants (none have yet been found). *A. microphylla* has narrowly oblong heads, at least in the fertile plant.

The above characters have been taken from manuscript supplied by the collector, Dr. J. Lunell, who secured the specimens near Leeds, N. D. The type sheet bears the accession No. 39,137.

University of Wyoming,
Laramie, Wyoming.

Vol. XX, pp. 41-42 March 27, 1907

PROCEEDINGS
OF THE
BIOLOGICAL SOCIETY OF WASHINGTON

DESCRIPTION OF A NEW *OTOCORIS* FROM LOWER CALIFORNIA.

BY HARRY C. OBERHOLSER.

On a previous occasion,* I doubtfully referred to *Otocoris alpestris actia* a pair of adult breeding horned larks from Santa Rosalia Bay, Lower California. Additional material from the peninsula confirms the suspicion of their subspecific distinctness, and enables me now to present a diagnosis under the name

Otocoris alpestris enertera subsp. nov.

Chars. subsp.—Similar to *Otocoris alpestris ammophila*, but smaller, the upper parts paler and more grayish, the cinnamomeous of nape, upper tail-coverts, and bend of wing more pinkish.

Measurements (*10 males*).—Wing, 91.5–99 (average, 96); tail, 60.5–64.5 (62.9); exposed culmen, 9.5–11 (10.5); tarsus, 18–21 (20.1); middle toe, 9.5–11.5 (10.6). (*13 females.*)—Wing, 89–96 (91.4); tail, 55–60.5 (57.8); exposed culmen, 9.5–11 (10.2); tarsus, 19–21.5 (20); middle toe, 9.5–11.5 (10.4) mm.

Geographical distribution.—Central Lower California, from about 24 degrees to 29 degrees north latitude.

Description.—Type, adult male, No. 196,076, U. S. N. M., Biological Survey Collection; Llano de Yrais (near Magdalena Bay), Lower California, December 13, 1905; E. W. Nelson and E. A. Goldman. Back, scapulars, and rump brownish gray, all the feathers with fuscous centers, more or less extensive, and darkest on the rump; wings fuscous, the quills, greater coverts, and primary coverts edged with brownish gray, the outer web of outermost primary nearly all white; lesser wing-coverts and upper tail-coverts cinnamomeous; tail black, the two middle feathers fuscous, margined with brownish gray, the exterior web of outermost pair of rectrices edged with white; occiput, cervix, and sides of neck pinkish cinnamomeous; crown, "horns," lores, cheeks, and jugular crescent black; auriculars yellowish white washed with grayish; forehead, superciliary stripe, and postocular streak yellowish white; chin and throat pale primrose yellow;

* Proc. U. S. Nat. Mus., XXIV, 1902, p. 848.

flanks, thighs, and sides of breast and of body light brownish cinnamon; rest of lower parts, including lining of wings, white.

This new race is in color very similar to *Otocoris alpestris leucolaema*, but is more grayish above, at least when in good plumage; and has the eyebrow usually more yellowish; furthermore, the greatly inferior size of *Otocoris a. enertera* distinguishes it at once. From *Otocoris alpestris actia*, whose range it approaches most closely, it differs very much more than from either *Otocoris a. ammophila* or *O. a. leucolaema*, being strikingly paler and more grayish throughout, as well as somewhat smaller.

The type specimen above described still retains some of the brownish gray edgings of crown, jugulum, and cervix, but otherwise represents the perfect breeding plumage. When badly worn, *O. a. enertera* looks more like *O. a. ammophila* than when in fresh condition, though it is still more grayish and pinkish above, and of course smaller. *Otocoris alpestris enertera* appears to be non-migratory; and its range, so far as known, extends in Lower California from Santa Rosalia Bay to the neighborhood of Magdalena Bay.

Vol. XX, pp. 43-52 April 18, 1907

PROCEEDINGS

OF THE

BIOLOGICAL SOCIETY OF WASHINGTON

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SOME UNRECOGNIZED AND MISAPPLIED NAMES OF AMERICAN MAMMALS.

BY WILFRED H. OSGOOD.

The type specimens of most of the mammals discussed below are preserved in European institutions where few American mammalogists have had opportunity to examine them. Mainly for this reason, their names, although mostly well known, have long been of doubtful status and are not generally accepted by recent authors. During the months of September and October, 1906, I visited several of the more important zoological museums of Europe and examined such American types as could be found in the limited time at my disposal. For the cordial reception and willing co-operation accorded me by the officers of these institutions, I am extremely grateful. I desire to thank especially Mr. Oldfield Thomas of the British Museum of Natural History; Dr. Paul Matschie of the Berlin Museum; Dr. E. L. Trouessart and M. Menegaux of the Paris Museum; Prof. Hertwig of Munich; Prof. Lang of Zurich, and Dr. Römer of Frankfort. During the investigation of names based upon European types, certain others requiring consideration were encountered in literature. Discussion of these also is therefore included.

Sciurus hudsonicus lanuginosus Bachman.

Sciurus lanuginosus Bachman, Proc. Zool. Soc. Lond., pp. 101–103, 1838; Townsend, Narrative of a Journey across the Rocky Mountains, Appendix, pp. 320-321, 1839; Aud. and Bach., Quad. N. Am., I, pp. 199–201, pl. XXV, 1851.

?? *Sciurus hudsonicus vancouverensis* Allen, Bull. Am. Mus. Nat. Hist., III, p. 165, 1890.

? *Sciurus douglasii cascadensis* Allen, loc. cit., X, pp. 277–278, 1898.

Although based upon an albinistic specimen, the name *lanuginosus* is apparently valid for one of the various forms of northwest coast chickarees. Bachman, in the original description, quotes from a letter from Townsend

regarding the specimen, as follows: '"Of this animal I have no further knowledge than that it was killed on the North-west coast, near Sitka, where it is said to be common; it was given to me by my friend W. F. Tolmie, Esq., surgeon of the Hon. Hudson's Bay Company."' A more exact statement of locality is made by Townsend himself in a signed note in the appendix to his narrative (supra cit.), thus: "It was presented to me by William Frasee Tolmie, Esq., surgeon of the Honorable Hudson's Bay Company, by whom it was captured near Fort McLaughlin, on the N. W. coast of America." As the distribution of the two forms of red squirrel occurring in the general region of Fort McLaughlin* is peculiar, the proper application of the name *lanuginosus* can not be determined without specimens from the exact type locality. River Inlet, B. C. is the locality nearest the site of Fort McLaughlin from which specimens are at hand and these have been referred by Dr. Allen (l. c.) to *S. h. cascadensis*. The type itself (No. 295, Coll. Acad. Nat. Sciences, Phila.), being albinistic, is not subspecifically identifiable, but the general color of the upperparts seems to indicate at least one of the western forms of the group. The underparts are entirely white and the anterior part of the head and the tail have white or whitish predominating. Dr. Allen in his Revision of the Chickarees (Bull. Am. Mus. Nat. Hist., X, p. 283, 1898) mentions the "marked tendency to albinism on the ventral surface in the whole *S. douglasii* group." A specimen from the range of *S. d. cascadensis* (No. 92,755, Trout Lake, Wash.), showing almost the same degree of albinism as the type of *lanuginosus*, is in the Biological Survey Collection.

Sciurus niger rufiventer Geoffroy.

Sciurus rufiventer Geoff., Cat. Mus. d'Hist. Nat., p. 176, 1803.

Sciurus ludovicianus Custis, Barton's Med. and Phys. Jour., II, p. 47, 1806—Red River, Louisiana.

Sciurus ruber Rafinesque, Annals of Nature, p. 4, 1820—"Missouri Territory."

Sciurus macroura Say, Long's Exped. to Rocky Mts., I, p. 115, 1823—northeastern Kansas—not *Sciurus macrourus* Erxleben 1777.

Sciurus magnicaudatus Harlan, Fauna Americana, p. 178, 1825—new name for *S. macroura* Say, preoccupied.

? *Sciurus subauratus* Bachman, supra cit., pp. 87–88, 1838—New Orleans market.

? *Sciurus audubonii* Bachman, supra cit., p. 97, 1838—New Orleans market.

Sciurus occidentalis Aud. and Bach., Proc., Acad. Nat. Sci., Phila., pp. 102–103, 1841.

Sciurus rubicaudatus Aud. and Bach., Quad. N. Am., II, pp. 30–31, pl. LV, 1851—Illinois.

Sciurus sayii Aud. and Bach., Quad. N. Am., II, pp. 274–276, pl. LXXXIX, 1851—new name for *S. macroura* Say.

* Fort McLaughlin is shown on a map published with the "History of California, Oregon, and the other countries on the Northwest Coast of America, by Robert Greenhow, 2d ed., Boston, 1845." On this map, it is situated on the north end of an unnamed island corresponding in position to Hunter Island of modern maps, being the second island of importance on the coast of British Columbia north of Vancouver Island.

Sciurus ludovicianus var. *atroventris* Engelmann, Trans. Acad. Sci., St. Louis, I, p. 329, 1859—near St. Louis, Mo.

Sciurus ludovicianus ludovicianus Bangs, Proc. Biol. Soc., Wash., X, p. 149, 1896.

Sciurus rufiventer Allen, Bull. Am. Mus. Nat. Hist., XVI, p. 167, 1902.

A mounted squirrel now in the Paris Museum (No. 556) appears to be the one used by Geoffroy as the basis of the name *Sciurus rufiventer*. The display label accompanying this specimen reads: "*Sciurus rufiventer* (Desm.). Type, Amerique N." On the under side of the stand is written in ink: "De l'Amerique septentrionale. *Sciurus rufiventer* Geoff. St. H. type des especies." The specimen is fairly well preserved and unquestionably represents the species recognized in recent years under the name *Sciurus ludovicianus*. The pelage is somewhat dingy and in color differs slightly from others of the same species with which it was compared. The difference however is one of degree only, the type being of a somewhat deeper shade of ferruginous. The entire underparts are rich ferruginous and the upperparts are of the same shade modified by a mixture of blackish; the nose and ears are not appreciably paler than the surrounding parts; the annulations of the hairs, tail, and all general markings are not peculiar. Owing to the posture of the mounted specimen, few measurements of value could be secured. The length of the hind foot to end of longest claw is 63 mm..

In endeavoring to determine the proper application of the name *rufiventer* and numerous others proposed for members of the same group, especially *S. texianus*, it has been necessary to review much of the history of the entire group and to investigate somewhat carefully the number and geographic distribution of the recognizable forms. The group appears to contain at least five recognizable forms, including *S. niger*, which intergrades with both *neglectus* and *texianus*. *S. niger* occupies Florida and the southeastern States; *S. n. neglectus* ranges from central Virginia and West Virginia to Pennsylvania; *S. n. texianus* is confined to the coast region of Louisiana and Mississippi; *S. n. limitis* occurs in western Texas and northeastern Mexico; while *S. n. rufiventer*, with the widest range of all, covers the greater part of the Mississippi Valley from northern Louisiana to southern Wisconsin.

The type of *rufiventer* was, according to Geoffroy, "donne et rapporte par Michaux." Either Andre Michaux or his son F. A. Michaux may have collected the specimen, since both traversed country inhabited by the species. The son, however, arrived in France, after his American travels, on March 26, 1803,* the same year that Geoffroy's Catalogue was published. The elder Michaux on one of his journeys traveled from Pittsburg west through parts of Ohio, Kentucky and Illinois to St. Louis, returning via Kentucky and Tennessee to Charleston, S. C.† During the greater part of this trip, he was within the range of the Mississippi Valley fox squirrel.

* F. A. Michaux, Travels to the Westward of the Allegany Mountains, Translation, London. p. 350, 1805.

† Thwaites, Early Western Travels, III, 1904.

In general terms, it may be said, therefore, that it is probable that the type of *S. rufiventer* came from some locality between southern Illinois and central Tennessee. In any event, the type of *S. rufiventer* agrees so closely with the Mississippi Valley form of fox squirrel as to justify the application of the name to it.

Sciurus niger texianus Bachman.

Sciurus texianus Bachman, Proc. Zool. Soc., London, pp. 86–87, 1838.

The essential part of the original description of this form is as follows:

"*Sciurus texianus.* Texian Squirrel. This name is proposed by Dr. Bachman for an apparently undescribed species which he saw in the museum at Paris. It is said to have been received from Mexico. In the museums of Berlin and Zurich, he also found what he conceives to be the same species; and in the British Museum there is a specimen obtained at Texas by Mr. Douglas, agreeing with the others in almost every particular. * * * The Texian Squirrel is about the size of the Fox Squirrel. On the upper surface there is a mixture of black and yellow, and on the *under parts deep yellow.* The under sides of the limbs, and also the parts of the body contiguous, are whitish. Fore-legs, externally, and the feet, rich yellow: ears, on both surfaces, yellow, with interspersed *white* hairs: *nose* and lips brownish *white*: hairs of tail, rich rusty-yellow at base, with a broad, black space near the extremity, and finally tipped with yellow.

DIMENSIONS.

	in.	lines.
"Length of body	13	6
Tail to end of hair	15	0
Tarsus	3	0
Height of ears to end of fur	0	6½"

This description is published with the report of the meeting of the Zoological Society of London for August 14, 1838, which opens with the following paragraph: "A series of skins, belonging to species of the genus *Sciurus*, including, with one or two exceptions, all which are known to inhabit North America, were upon the table; and the Rev. Dr. Bachman, of S. Carolina, brought them severally before the notice of the members.

"Five of the species exhibited were new, and for these he proposed the specific names of *texianus*, *lanuginosus*, *fuliginosus*, *subauratus*, *audubonii*, and *richardsonii*."

Dr. Allen (Bull. Am. Mus. Nat. Hist., XVI, pp. 166–167, 1902) has called attention to the name *texianus* and proposes to adopt it for the small, pale fox squirrel (*limitis*) of west-central Texas. But, as noted by Bailey (N. Am. Fauna, No. 25, p. 77, footnote, 1905), Bachman's description is not applicable to this form. Of the specimens mentioned by Bachman, I have lately examined the one in the Paris Museum and the one in the British Museum and am convinced the latter should be considered the type. It agrees perfectly with the description, which was doubtless prepared as well as published in London, and, moreover, it must be the specimen exhibited at the meeting of the Zoological Society in the report of which the name was proposed.

It represents a form which seems worthy of recognition though somewhat intermediate in characters between *niger* and *rufiventer*. It is slightly larger than *rufiventer*, but has the same ferruginous general coloration, while the nose and ears are white but less extensively so than in *niger*. Specimens showing these characters are in the Biological Survey Collection from Pontchatoula and Rayne in the coast region of Louisiana, and from Bay St. Louis, Mississippi.

My own notes of importance on the type specimen are as follows:

"It is a richly colored specimen and agrees most nearly with a British Museum specimen from Louisiana received from Audubon. The top of the head has black predominating though there is considerable ochraceous. The forehead and nose are bare of hair except a little patch on the nose which is soiled white and from this I should judge that the nose was *extensively whitish*. The ears are ochraceous, of a paler shade than the surrounding parts, even inclining to *whitish* in places. Length, nose to base of tail over body, 345 mm.; tail vertebrae, 280; hind foot, 74.k" The specimen is No. 204*a* and is labeled and entered in the British Museum register as "*Sciurus texianus* Bachm. Texas."

The specimen in the Paris Museum is No. 452 and labeled "*Sciurus texianus* (Back.) Type. M. Price. Texas." On the bottom of the wooden stand on which it is mounted is some illegible writing and the following: "du Texas. *Sciurus texianus* (Bach.). Bachman—probl.' le type." The pelage is rather worn, the upperparts are chiefly grayish, and the underparts are *practically white*. It measures: Head and body, 300 mm.; tail vertebrae, 280; hind foot, 70. This specimen should perhaps be referred to *S. n. limitis*, but it is not improbable that it is an example of *S. n. neglectus* wrongly attributed to Texas. Its completely white underparts are absolutely incompatible with Bachman's description of *texianus*, in which these parts are said to be deep yellow. Therefore, it can not justifiably be taken as the type of *texianus*.

The locality "Texas" assigned to the British Museum specimen is doubtless erroneous since Douglas did not collect in that State or within the range of this squirrel. The only recently collected specimens agreeing with it are from the coast of Louisiana and Mississippi, representing a hitherto unrecognized form, which, therefore, takes the name *Sciurus niger texianus*.

Castor canadensis leucodontus Gray.

Castor canadensis leucodonta Gray, Ann. & Mag. Nat. Hist., ser. 4, IV, p. 293, 1869.

Castor canadensis pacificus Rhoads, Trans. Am. Philos. Soc., n. s. XIX, pp. 422–423, pl. XXI, fig. 1, pl. XXII, fig. 1, Sept., 1898—Lake Kichelos, Washington.

It appears necessary to use the above name for the beaver of the Northwest coast lately called *pacificus*. The original description is limited but its basis is readily determinable. Three specimens are mentioned, collected by Robert Brown on the Northwest coast of America and doubtless still preserved in the British Museum. The exact locality is not stated but it

is extremely probable that the specimens came from some part of Vancouver Island. In a paper* on the beaver by Dr. Brown published at about the same time as Gray's name *leucodonta*, the notes relate almost entirely to Vancouver Island. The most important in this connection are the following:

"Near Victoria, in Mr. Yale's Swamp, and in one near Dr. Tolmie's, are several beavers; and on the road to Cadborough Bay there are * * * the remains of an old dam. In the interior they are almost everywhere abundant and on the increase. In a swampy lake near the mouth of the Cowichan Lake we found many; and an extensive swamp near the entrance of the Puntledge Lake was a great stronghold. On Young's Creek, flowing into the same lake, were many dams. In the spring of 1866, when crossing the island from Fort Rupert to the head of Quatseeno Sound with some Indians, a great portion of our route lay among these beaver ponds and dams. All through this district beavers swarm."

Microtus ochrogaster Wagner.

Hypudaeus ochrogaster Wagner, Suppl. Schreber's Säugeth., III, p. 592, 1842.

Arvicola austerus Le Conte, Proc. Acad. Nat. Sci., Phila., VI, pp. 405–406, 1853—Racine, Wisconsin.

Arvicola (*Pedomys*) *cinnamomea* Baird, Mamm. N. Am., p. 541, 1857—? Pembina, N. Dakota.

Microtus (*Pedomys*) *ochrogaster* Allen, Bull. Am. Mus. Nat. Hist., X, p. 459, 1898.

In the original description of *H. ochrogaster*, Wagner mentions two specimens. Both are preserved in good condition in the zoological collection of the University of Munich (Konigl. Bayr. Ludwig-Maximilians-Universität). They are evidently conspecific, but the larger one, of which Wagner published measurements, may be considered the type. It appears to be a normal example of the species currently called *Microtus austerus*. The hind foot, which is slightly curved, measures 19 mm.; the tail, 31.5 mm. The skull is imperfect, lacking the audital bullæ, end of nasals, right zygoma, and under part of braincase. The following measurements, however, were taken: Gnathion to posterior border of interparietal, 27.4; gnathion to posterior edge of last molar, 17.4; interorbital constriction, 4.2; width across last molars, 5.6; width across first molars, 5; maxillary toothrow, 6.4; mandibular toothrow, 6.3.

Unfortunately, the two specimens bear no exact data, having been received from a dealer with the information that they came from America. Considering the early date, it is probable that their original source was some point along the commercial highways of the time, the Mississippi, Missouri, and Ohio rivers, all of which traverse country inhabited by the species.

The paler western subspecies should be called *Microtus ochrogaster haydeni*.

* Journ. Linnaean Soc., Lond., X, pp. 361–372, 1869.

Synaptomys borealis (Richardson).

Arvicola borealis Richardson, Zool. Journ., III, p. 517, 1828; Fauna Boreali-Americana, p. 127, 1829; Aud. and Bach., Quad. N. Am., III, p. 134, pl. CXXIX, 1854.

Richardson's descriptions of *Arvicola borealis* are very complete and even accompanied by the significant statements: "It may, however, be considered as an intermediate link between the two subdivisions of the genus *arvicola*, and may without inconvenience be ranked either as a true meadow-mouse or as a lemming"; and, "the thumb of the forefeet consists merely of a small strap-shaped nail." Later Audubon and Bachman published further descriptions and a colored figure based upon an examination of Richardson's original material. Yet recent authors have been unable to assign the name satisfactorily. It has usually been supposed to refer to the genus *Microtus*,† but the type, No. 42. 10. 7. 10 British Museum, is a characteristic example of the genus *Synaptomys*, subgenus *Mictomys*. It bears an early label with the following data: "*Arvicola borealis*. Mouse A. 42. 10. 7. 10. See p. 12. Note book. Awinnak, Dog-ribs. 4½ inches long exclus. tail. Fort Franklin. Dr. R." The skin is in fair condition and shows a well developed pair of the characteristic whitish rump patches. The fragments of the skull which were removed from the skin for my examination include the nasals and grooved upper incisors, some of the lower molars, and the upper molars of the right side. Measurements of these fragments are: Length of nasals, 7.5; palatine slits, 5.1; alveolar length maxillary toothrow, 7.7; crowns of maxillary toothrow, 7.2.

Peromyscus polionotus (Wagner).

Mus polionotus Wagner, Archiv. f. Naturg. v. Wieg., II, p. 52, 1843.

Peromyscus subgriseus arenarius Bangs, Proc. Bost. Soc. Nat. Hist., XXVIII, pp. 202-293, 1898—not *P. eremicus arenarius* Mearns, 1896.

Peromyscus subgriseus baliolus Bangs, Science, N. S., VIII, pp. 214-215, Aug. 19, 1898—Hursman Lake, Georgia.

The type of this species is a fairly well preserved mounted specimen in the Natural History Museum (Universität Institute und Sammlungen) at Zurich, Switzerland. Its identity as a member of the group of small mice containing the forms well known under the names *subgriseus* and *niveiventris* is obvious. It is said to have come from Georgia and its color, which is not greatly changed by exposure, agrees well with recently collected specimens from that region.

Reithrodontomys humulis Bachman.

Mus humulis (Bachman) in Aud. and Bach., Proc. Acad. Nat. Sci., Phila., pp. 97-98, 1841.

?? *Mus carolinensis* Aud. and Bach., Journ. Acad. Nat. Sci., Phila., p. 306, 1842.

Mus lecontii Aud. and Bach., Journ. Acad. Nat. Sci., Phila., p. 307, 1842.

†Cf. Rhoads, Proc. Acad. Nat. Sci. Phila., pp. 285-286, 1894; Miller and Rehn, Proc. Bost. Soc. Nat. Hist., XXX, p. 116, 1901.

Mus humilis Aud. and Bach., Quad. N. Am., II, pp. 103–106, pl. LXV, 1854.
Reithrodontomys leconti Allen, Bull. Am. Mus. Nat. Hist., VII, p. 116, 1895.

Dr. Allen (supra cit.) has refused recognition to *Mus humulis* Bachman, 1841, for the eastern little harvest mouse and adopted in its stead the later *Mus lecontii*. He says: "While in general the description of *Mus humulis* Aud. and Bach. applies satisfactorily to the species of *Reithrodontomys* occurring near the coast in South Carolina and Georgia, it is singular and noteworthy that these authors failed to mention the grooved incisors in any of the three descriptions given by them of this species; especially when they so particularly refer to the character of the molars, which they compare with those of *Mus* and *Arvicola*, remarking (Quad. N. Am., II, p. 106) 'that there are angular ridges in the enamel,'" etc. Thus it seems (disregarding mere opinions expressed or indicated without stated reasons by LeConte and Baird) that the name *humulis* is rejected solely because its authors failed to mention the grooved incisors. This in spite of the facts that the original description is otherwise perfectly applicable to a *Reithrodontomys*, that the proper vernacular name "Little Harvest Mouse" is coupled with it, and that the accompanying extensive account of habits also indicates *Reithrodontomys*. Moreover, by exclusion, the description again indicates *Reithrodontomys* for it could not apply to *Mus* or to *Peromyscus*. The reference to the subsequent lack of mention of the grooved incisors in the Quadrupeds of North America as additional evidence that *Reithrodontomys* was not intended is absolutely negatived by the accompanying colored plate (pl. LXV) which is an excellent representation of *Reithrodontomys*. The description with this plate is essentially like the original description and although the grooving of the incisors is not mentioned, there is no statement that they are not grooved. As regards other particulars, a better description of *Reithrodontomys* could not be desired. It seems, therefore, that *Reithrodontomys humulis* should be reinstated. *Mus carolinensis* is doubtfully referred by Dr. Allen (l. c.) to the synonomy of *Reithrodontomys leconti* with the opinion that it is "not determinable; probably a young *Peromyscus*." To this conclusion one may readily agree for here there are contradictions, the description of color and size indicating a young *Peromyscus*, while the mention of the slightly grooved incisors suggests *Reithrodontomys*. Had it been stated in the description of *M. humulis* that the incisors were not grooved the case would be more comparable to that of *M. carolinensis* and the name might well be rejected as indeterminate.

Reithrodontomys cherriei (Allen).

Hesperomys (*Vesperimus*) *cherrii* Allen, Bull. Am. Mus. Nat. Hist., III, pp. 211–212, 1891.
Reithrodontomys costaricensis Allen, supra cit., VII, p. 139, 1895.

The specimens forming the basis of the name *cherrii* are indicated in the original description, as follows: "Six specimens, as follows: skin (♂? adult), San José, June 9, 1889, C. F. Underwood; five specimens in spirits (2 ♂ ad., 1 ♀ ad., and two half-grown young), La Carpintera (altitude about 6,000 feet), Oct.–Nov., 1890, George K. Cherrie." Through the good offices

of Dr. Allen, and in connection with work on the genus *Peromyscus*, these specimens, except the two half-grown young which are not extant, were examined. The skin without skull and all the spirit specimens, except one, unquestionably are examples of the species called *Reithrodontomys costaricensis*, as agreed by both Dr. Allen and myself. The remaining spirit specimen is the only one from which the skull has been removed. It does not essentially differ from the others externally but the skull supposed to belong with it is that of a species of *Peromyscus* and can readily be duplicated among skulls of several subspecies of *Peromyscus* of the *sonoriensis* type from the United States. No *Peromyscus* of this type has been found elsewhere south of Mexico, so the suspicion can scarcely be avoided that this case may be similar to that of "*Blarina costaricensis*," * the type of which was included in the same collection with these mice. This suspicion is strengthened by the fact that in the jar containing the specimens of *Reithrodontomys* was an undoubted *Peromyscus* (referred to *sonoriensis* by Dr. Allen) from which the skull had been removed. However, Dr. Allen assures me that the possibility of transposition of skulls is exceedingly remote. The case is unfortunate but may be settled by selecting one of the specimens as type† and confining the name to the species and genus represented by that specimen. The skin from San José therefore may be chosen, since it is mentioned first, since it is the basis of the color description, and since it is conspecific with a majority of the other specimens. Under no circumstances would it appear advisable to select the other specimen to which the skull of a *Peromyscus* is attributed, while any doubt remains as to the association of skin and skull.

Lepus cunicularius Waterhouse.

Lepus cunicularius Lichtenstein, Waterhouse, Nat. Hist. Mammalia, II, pp. 132–133, footnote, 1848.

Lepus veracrucis Thomas, Proc. Zool. Soc., Lond., p. 74, pl. VI, 1890.

The name *Lepus cunicularius*, published by Waterhouse with a description based upon notes communicated to him by Bachman, was credited to Lichtenstein, and specimens in the Berlin Museum were mentioned. These, two in number, still exist, mounted and in excellent condition. Both were collected by Deppe and are accompanied by valuable data. One of them, which was received at the Museum earlier than the other, bears evidence of having been selected as the type. A label pasted on the bottom of the exhibition stand reads:

* Cf. Merriam, N. Am. Fauna No. 10, pp. 12–13, 1895.

† The right of an author to select as type of a species an individual not originally designated as such may be questioned. In this case no alternative appears unless it be to restrict the name to such majority of the original specimens as are conspecific. If this course is justifiable, no good reason appears why a definite type should not be selected. Since the original material is not only not conspecific but not congeneric, some selection and restriction is imperative or the name must be entirely rejected.

"*Lepus cuniculariu*s N.* (Conexo) Sacualpan July 26." It is numbered 1503 and its entry in the museum register is as follows:

"1503 *Lepus cuniculariu*s Lichtenstein * Waterhouse, Mammalia II, p. 132. Sacualpan July 26 Deppe, Conexo."

The second specimen is labeled "*Lepus cuniculariu*s (Canejo) ganz weisses sehr gutes fleisch. Xalapa. Febr.," all being in the handwriting of Deppe except the word *cuniculariu*s which is in that of Lichtenstein. Both specimens appear to represent the species later called *veracrucis* by Thomas. A careful comparison of them with the description, measurements, and colored figure of *veracrucis* finds essential agreement in all respects. The localities Sacualpan and Jalapa in Vera Cruz are but a short distance from Las Vigas, the type locality of *veracrucis*.

Scapanus latimanus (Bachman).

Scalops latimanus Bachman, Boston Journ. Nat. Hist., IV, pp. 34–35, 1842.

Scalops californicus Ayres, Proc. Calif. Acad. Sci., I, p. 54, 1855—San Francisco, California.

Scapanus townsendi Peters, Monatsber. K. Akad. Wissensch., Berlin, p. 656, 1863.

Scapanus dilatus True, Proc. U. S. Nat. Mus., XVII, p. 242, 1894.

Scapanus californicus True, Proc. U. S. Nat. Mus., XIX, p. 52, 1896.

The name *Scalops latimanus* has been referred to the synonymy of *Scapanus townsendi*, first by Peters and later by True. But its type, in the Berlin Museum, is without doubt an example of the species currently known as *Scapanus californicus*. As stated by Peters (l. c.), it was transmitted by Deppe from Monterey, California. It was collected in October, 1834, at Santa Clara, not a Mexican locality, as suggested by Peters, but doubtless the town of that name in California not very distant from Monterey. Only one species of mole is known to occur at this locality, and the specimen is typical of this species. The hind foot to end of claws measures 18.7 mm. The fragmentary skull, which Dr. Matschie caused to be removed from the mounted specimen, presents the following measurements, all decidedly smaller than *S. townsendi*: Length of upper toothrow from front of incisor to back of last molar, 15.4; of lower toothrow, 13.7; outside width at second upper molar, 10.2.

* The letter *N* following the name is intended as an abbreviation of *nobis* and the asterisk after the word Lichtenstein which is found in the museum register, indicates, as Dr. Matschie informs me, a type specimen. The entry was made by Peters in 1860.

Vol. XX, pp. 53-54 April 18, 1907

PROCEEDINGS
OF THE
BIOLOGICAL SOCIETY OF WASHINGTON

A NEW RACE OF THE MANGROVE CUCKOO, FROM GRENADA AND THE GRENADINES.

BY OUTRAM BANGS.

In his paper, Birds of the Southern Lesser Antilles,* Austin H. Clark referred the mangrove cuckoo of Grenada and the Grenadines to the continental *Coccyzus minor minor*. This was done, however, without a specimen from the mainland for comparison. Upon recently comparing the Grenadine bird with three skins in my collection from Costa Rica, I find that it can not be referred to true *C. minor minor* if the Costa Rican specimens represent that form (as I think they do), and as it certainly can not go with either *C. minor vincentis* Clark, of St. Vincent and St. Lucia, or *C. minor dominicæ* Shelly, of Dominica, I propose to call it,

Coccyzus minor grenadensis subsp. nov.

Type.—From Union Island (one of the Grenadines) southern Lesser Antilles, adult ♂, No. 12,978, coll. of E. A. & O. Bangs. Collected April 9, 1904, by Austin H. Clark.

Characters.—Size large and bill long and heavy as compared with *C. minor minor* of the mainland, *C. minor maynardi* of Florida and the Bahamas, or *C. minor nesiotes* of the Greater Antilles and northern Lesser Antilles; slightly smaller, with somewhat smaller bill than either of the other two forms of the southern Lesser Antilles, *C. minor dominicæ* of Dominica and *C. minor vincentis* of St. Vincent and St. Lucia.

Colors very pale, throat and breast usually dull white, with sides of neck grayish; belly and sides buff. Much paler than either *dominicæ* or *vincentis* and in color not unlike *maynardi*.

Geographic distribution.—Grenada and the Grenadines, southern Lesser Antilles.

MEASUREMENTS.

No.	Sex.	Locality.	Wing.	Tail.	Tarsus.	Culmen.
12978	♂	Union Island.	134	173	28	31
12976	♀	do	136	167	28	29

* Proc. Boston Soc. of Nat. Hist., Vol. 32, No. 7, pp. 263–266, Oct., 1905; see also in this connection, J. N. Riley, Smiths. Misc. Coll., Vol. 47, part 2, No. 1485, Nov. 8, 1904.

(For table of comparative measurements of *vincentis, dominicæ* and *grenadensis* called there *minor*, see Clark, Proc. Bost. Soc. Nat. Hist., Vol. 32, p. 266, 1905.)

Remarks.—As in this connection I carefully compared a large amount of material, I feel that a few general remarks on the mangrove cuckoo are necessary in order to make my point clear. *Coccyzus abbotti* Stone, of St. Andrews, Id., is the only form I have not seen. It appears from the description, however, to be well marked. The other races of *C. minor* fall naturally into two groups:—

1. Including *C. minor minor, C. m. maynardi* and *C. m. nesiotes*, characterized by small size, and short, slender bill.

These three forms are closely related, still there seem to be slight differences by which specimens in the same condition of plumage can usually if not always be told apart. In all three races, the buff or ochraceous colors of the under parts fade out from exposure to light as the plumage becomes worn. Thus, freshly moulted examples are much more intensely colored below than skins in which the plumage has evidently been worn for some time. Three skins of true *C. minor* from Costa Rica, taken at different seasons of the year, are very different one from the other in the color of the under parts, and examples of *C. minor nesiotes* from Jamaica show the same seasonal differences, so that general paleness or intensity of coloring are not necessarily characters by which the different races can be told. Curiously enough, among the large number of skins of *C. m. maynardi* examined there are none in freshly moulted plumage.

The real characters of these three races are, briefly, as follows: *C. minor minor* lacks almost entirely the grayish shading of the sides of the neck found in both *C. minor nesiotes* and *C. minor maynardi* and by this character can at once (in every skin I have examined) be distinguished. *C. minor nesiotes* and *C. minor maynardi*, both having gray on the sides of the neck, differ from each other in the former (*nesiotes*) being nearly uniformly colored below, the throat and breast but little paler than the belly and sides, whereas the latter (*maynardi*) has the throat and breast dull grayish-white or whitish, in contrast to the buff or ochraceous of the rest of the under parts.

2. Including *C. minor dominicæ, C. m. vincentis* and *C. m. grenadensis* distinguished by slightly larger size and much longer and stouter bill. These three races differ among themselves slightly in size, size of bill, and in color. *C. m. dominicæ* is the largest, while its bill is intermediate in size between those of the other two races; the under parts are deep tawny-ochraceous in color, darker and richer than in either of the other two (of course comparing specimens in the same condition of plumage). *C. minor vincentis* is a little smaller, but has the largest bill of the three forms, the colors of its under parts are paler than in *dominicæ* and not so reddish, but much darker than in *grenadensis*. *C. m. grenadensis* is the smallest, with the smallest bill, and has the under parts distinctly paler than in either of the others, with the throat and breast dull grayish-white or whitish.

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PROCEEDINGS

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A NEW SPINY-TAIL FROM THE SIERRA NEVADA DE SANTA MARTA, COLOMBIA.

BY OUTRAM BANGS.

Dr. C. E. Hellmayr has lately called my attention to the fact that the spiny-tail from the Sierra Nevada de Santa Marta, Colombia, which other ornithologists and myself have been calling *Siptornis antisiensis* (Sclater) is not that species, but a form quite different from it in many respects.

Dr. Hellmayr's comparison was made with the type of *S. antisiensis* from Cuenca, south Ecuador, another specimen (♂ad.) from Guayabamba, northern Peru, and one moulting specimen in the British Museum, taken by Simons many years ago in the Santa Marta region of Colombia.

The four skins now in my collection bear out all the characters mentioned by Hellmayr, and the Santa Marta bird appears to be a very distinct new species, which I take pleasure in calling after my indefatigable friend,—

Siptornis hellmayri sp. nov.

Type.—From El Paramo de Macotama, Sierra Nevada de Santa Marta, Colombia, altitude, 11,000 feet, No. 6184, ♂ adult, coll. of E. A. and O. Bangs. Collected February 1, 1899, by W. W. Brown, Jr.

Characters.—Somewhat similar in general to *S. antisiensis* (Scl.) of southern Ecuador and northern Peru, but distinguished at a glance in having the crown from the base of the bill, distinctly striped with black (the crown in *S. antisiensis* is uniform bright ferruginous, without a trace of dusky striping); back much brighter, more fulvescent, less dull olive-brown; wing brighter, clear cinnamon-rufous; superciliary streak narrower, less conspicuous, and less purely white; bill longer and more curved.

Measurements.—Four adults from Sierra Nevada de Santa Marta measure respectively as follows: wing, 62.5, 65, 63, 62.5; tail, 64, 65, 60, 60.5; tarsus, 19.5, 20, 19.5, 20; culmen, 14, 15, 14, 13.5.

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PROCEEDINGS

OF THE

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A NEW SOUTH AMERICAN BAT.

BY A. CABRERA LATORRE.

The subject of the present note is a large *Noctilio* from eastern Ecuador, very different from *N. mastivus*, and represented by three specimens in the Museum of Natural Science of Madrid (Spain). On account of the lack of valuable material for comparison, it was previously taken for *N. albiventer* Spix; but now, as I have in my private collection, through the kindness of Marquis Doria, of Genoa, specimens of true *albiventer* from Paraguay and Bolivia, it appears from close examination that the Ecuadorian bat belongs to quite a different form. I name this species:

Noctilio zaparo* sp. nov.

Type from Ahuano, on the Napo river, eastern Ecuador. ♂ adult. Collected by Dr. M. Timenez de la Espada, May, 1865. No. 691, Museum of Natural Science of Madrid, Spain.

Diagnosis.—Closely allied to *N. albiventer*, but larger and stouter, and with the ridges on the skin of the lower jaw much reduced.

External Characters.—Forearm about 68 mm., and, notwithstanding, comparatively short. In *N. albiventer*, with wings folded close to the body, the forearms exceed the muzzle 6–8 mm.; in *zaparo*, the carpus does not reach to the nose level. The wing indices are about the same in both species. Ears comparatively shorter in *zaparo*, hardly reaching the external rim of the nostrils when laid forward, whereas in *albiventer* they slightly exceed the muzzle tips. Three semi-oval cutaneous ridges on the chin, as usual, but the skin beneath the lower jaw is smooth, with only five or six short, vertical furrows, almost imperceptible without a very close inspection, immediately behind the chin ridges.

Color.—Upper parts of body beautiful golden reddish fawn. Under surface pale reddish yellow. The sides, immediately below the plagiopatagium, bright yellowish red. Membranes brown, with some irregular, broad, pale streaks parallel to the digits. The coloration is not altered by the alcohol.

* "*Zaparo*," with the accent on the first a, is the name of the Napo river Indians.

Skull.—Similar to that of *N. albiventer*, but comparatively a little shorter and broader.

Measurements. (Type, in alcohol.)—Head and body, 80 mm.; length of ear, 18.5; greatest breadth of ear, 8.5; tragus, 4.4; forearm, 67; third finger: metacarpal, 55; first phalanx, 14.3; second phalanx, 44; fourth finger: metacarpal, 56.9; first phalanx, 9.4; second phalanx, 26; fifth finger: metacarpal, 54; first phalanx, 11.5; second phalanx, 4; tail, 17; length of uropatagium beyond the tail, 30.5; tibia, 24; foot, 18; calear, 35. Skull: Length from front of canines, 20.5; width at base of canines, 8.2; upper toothrow, excepting incisor, 7.2.

Remarks—There are in the Madrid Museum, besides the type, two mounted specimens, one of which (sex undetermined) has the forearm 70 mm. long. They were also collected on the Napo river by Dr. Timenez de la Espada. The collector's note-book contains the following short note about these bats: "They fly over the river, slightly touching the water with the wings."

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PROCEEDINGS

OF THE

BIOLOGICAL SOCIETY OF WASHINGTON

A COLLECTION OF MAMMALS FROM THE REGION OF MOUNT McKINLEY, ALASKA.

BY WILFRED H. OSGOOD.

Through the interest and liberality of Mr. Charles Sheldon, of New York, the Biological Survey collection has recently been enriched by a small but valuable collection of mammals from the little-known region about the northeast base of Mount McKinley, in the interior of Alaska. Mr. Sheldon spent the latter part of July about the northern base of Mount McKinley; and all of August, 1906, in the vicinity of the head of the Toklat River, having reached these localities by way of the Tanana and Kantishna rivers, traveling by steamboats to the junction of the Kantishna and Toklat and thence with pack-horses to the sources of the Toklat, high on the slopes of the Alaskan Range.

This region is mainly treeless. Mr. Sheldon writes: "At the foot of the Alaskan range on the north side, there is a belt from ten to twenty miles wide of country extending north, all rolling and completely destitute of timber except a few willows along the streams. At a few points, the timber (spruce) runs up to within seven or eight miles of the mountains. There is a strip of timber running to the foot of the Peters Glacier, then no spruce timber thence to the second branch of the Toklat River, and then no timber for fifteen miles east on another branch. My camps were all in the timberless region or at the head of the timber mentioned."

Although occupied chiefly in hunting and studying the habits of mountain sheep and other large game, Mr. Sheldon preserved specimens of small mammals also. Most interesting of these, is a small Alpine vole which not only represents a slightly characterized new subspecies but also belongs to a group of rare species hitherto known only from the Kenai Peninsula and cer-

tain islands of Bering Sea. Such records and notes in the following list as are not derived from actual specimens are based upon information received from Mr. Sheldon, whose extended natural history notes, it is to be hoped, will find publication at some future time.

Rangifer stonei Allen.

STONES CARIBOU

On his way into the base of Mount McKinley about the middle of July, Mr. Sheldon saw many caribou, but it was then too early to secure specimens with perfect antlers, so he planned to get them on his way out, but on the return trip not an adult male was seen. However, he secured in Tanana a pair of locked antlers which had been found near the head of the Cosna River. These seem referable to *R. stonei*. One of them has a considerable part of the skull attached, including nearly perfect toothrows. The length of the toothrow is 104 mm. Measurements of the antlers are, respectively, as follows:

Length main beam (along side) 1090, 1265; greatest spread between palmations 710, 570; greatest spread between bez tines 645, 665; circumference of beam between brow and bez tines 152, 136; number of points in palmations 10—8, 3—3; number of points in bez tines 7—8, 4—3; number of points in brow tines 7—4, 7—1; total number of points 42, 21.

Alce americanus gigas Miller.

ALASKA MOOSE.

A few moose and numerous signs were seen in the vicinity of the base of Mount McKinley and near the mouth of the Toklat, but no specimens were preserved. They are abundant throughout the timbered part of the region, to which, however, they are not confined, as they frequently traverse open country.

Ovis dalli Nelson.

DALL SHEEP. WHITE SHEEP.

Seven specimens, six adult males and one (skull) adult female, taken August 10–30. Indefinite reports have been current to some extent to the effect that the sheep of Mount McKinley and the Alaskan Range were larger or smaller or otherwise different from the other Alaskan sheep. Such reports seem to be groundless, for the specimens are identical with those from the Kenai Peninsula, referable to *Ovis dalli*. The skins are practically pure white, but careful search reveals a very few dusky hairs here and there on the back and a very small and mostly concealed proportion of them on the tail. The pelage is entirely new and rather full and long but shows considerable brown earth stain. The skulls and horns do not appear to differ in any important respect from those of typical *Ovis dalli*. The region seems to be a great stronghold of the white sheep, but although hundreds of ewes and lambs were seen almost daily, rams were found only in very small numbers after long and determined hunting.

Sciurus hudsonicus Erxleben.

RED SQUIRREL.

Common in all the timber.

Citellus plesius ablusus Osgood.

GROUND SQUIRREL.

Eight specimens, mostly adults, from the base of the Muldrow Glacier and the head of the Toklat River. These are typical examples of *ablusus*, and thus carry its range considerably to the northeast, the nearest point from which it was previously known being the head of Lake Clark.

Marmota caligata (Eschscholtz).

HOARY MARMOT.

One specimen, a very fine old female, killed on the Peters Glacier, one of the few good adults of this species now in collections from the interior of Alaska.

Castor canadensis Kuhl.

BEAVER.

Of rather rare occurrence, in interior ponds only. No specimens.

Evotomys dawsoni Merriam.

DAWSON RED-BACKED MOUSE.

Two specimens, both from the wooded region at the mouth of the Toklat.

Microtus miurus oreas subsp. nov.

Type, from head of Toklat River, Alaskan Range, Alaska. No. 148,596 U. S. National Museum, Biological Survey collection. ♂ ad. August 8, 1906. C. Sheldon. Original No. 47.

Characters.—Similar to *M. miurus*, but tone of color more ochraceous (not so yellowish) throughout; tail slightly shorter and chiefly ochraceous, slightly or not at all darker above than below.

Color.—Type, in worn pelage: Upperparts and sides pale ochraceous buff or clay color somewhat toned down on back by a slight mixture of dusky and exposure of the plumbeous bases of the hairs; underparts uniform pale ochraceous buff; feet creamy buff; tail pale ochraceous buff with very faint traces of dusky on upper side.

Skull.—Very similar to that of *M. miurus* but somewhat narrower; braincase more elongate; zygomata less flaring anteriorly.

Measurements.—Type and one topotype, repectively: Total length, 125, 120; tail vertebrae, 20, 19; hind foot (dry), 19.2, 19. Skull of type: Basal length, 26.7; basilar length, 23.9; mastoid width, 11.4; interorbital constriction, 3.4; nasals, 7.4; maxillary toothrow, 6.

Remarks.—Seven specimens of this vole were secured in the high mountain meadows near the head of the Toklat River. Two of these are adult males and the remainder immature, but the entire series is characterized

by a richer and more reddish coloration than that of typical *miurus*, of which specimens in exactly comparable pelage are available.* The tail is even shorter than in *miurus* and with little or no dark color on the upper side. The slight cranial characters noted above may not prove constant. The form doubtless occurs throughout the higher parts of the Alaskan Range and this is probably the extent of its distribution, for collecting in the mountains near the Yukon River and in the northern Rockies has failed to reveal it or any near relative.

Since Mr. Sheldon's trapping was chiefly confined to the region above timberline, this was the only species of *Microtus* taken. Some or all of the following probably occur at somewhat lower altitudes in the region: *M. operarius*, *M. drummondi*, *M. mordax* and *M. xanthognathus*.

Fiber spatulatus Osgood.

MUSKRAT.

Common about ponds in the less elevated parts of the region.

Erethizon epixanthus myops Merriam.

PORCUPINE.

Occurs throughout the timbered part of the region. No specimens.

Ochotona collaris Nelson.

COLLARED PIKA.

Five specimens, three from near the Peters Glacier, taken July 28th, and two from the base of the Muldrow Glacier, taken August 2d. All are typical of this species, which doubtless occurs in suitable places on all the high mountains of the interior of Alaska. Mr. Sheldon reports that pikas were abundant in the vicinity of his camps.

Lepus americanus dalli Merriam.

DALL VARYING HARE.

Hares were seen in abundance well down in the timber but no specimens were secured.

Lynx canadensis (Kerr).

CANADA LYNX.

Common where rabbits are to be found. One was killed on the Tanana River but was not preserved as a specimen.

Canis albus (Sabine).

NORTHERN WOLF.

Wolves are abundant, chiefly above timber, where many tracks were found.

*The Biological Survey series of *M. miurus* being quite small, specimens from the American Museum of Natural History, kindly loaned by Dr. J. A. Allen, have also been used for comparison.

Vulpes fulvus subsp.

FOX.

Very abundant, especially above timber. Several were seen, including black or nearly black individuals. No specimens.

Ursus horribilis phaeonyx Merriam.

GRIZZLY BEAR.

Six grizzlies were secured, three adult females, and three cubs, the latter being the offspring of one mother. They show much variation in color, especially the cubs, one of which is very pale, another very dark, and the third almost exactly intermediate. All were killed high up on the mountain slopes far above timber, to which region they seem largely confined. The name "Glacier Bear" is locally applied to light colored examples of this grizzly.

Ursus americanus Pallas.

BLACK BEAR.

A black bear was seen on the Kantishna River and many tracks were noted in various parts of the timbered region, where the animals are evidently very abundant.

Lutra canadensis (Schreber).

OTTER.

Otters occur in limited numbers. No specimens.

Lutreola vison subsp.

MINK.

Common. Several were seen along the Kantishna and Tanana Rivers and numerous skins were seen in the possession of trappers on the Toklat.

Mustela americana actuosa Osgood.

MARTEN.

Common throughout the timbered part of the region. Trappers' skins seen on the Toklat were noted as being light colored and therefore probably represent the subspecies *actuosa*.

Gulo luscus (Linnaeus).

WOLVERINE.

Common throughout the region, except in the timberless belt, and doubtless also to be found there. Skins were seen among the trappers on the Toklat.

Sorex sp.

SHREW.

No specimens of shrews were secured, but that they occur is attested by the fact that the remains of one were found in the stomach of a bear. Those of probable occurrence are *Sorex personatus arcticus*, *S. obscurus*, *S. tundrensis*, and *S. eximius*.

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PROCEEDINGS

OF THE

BIOLOGICAL SOCIETY OF WASHINGTON

GENERAL NOTES.

A NEW NAME FOR THE GENUS *RHYNCHONYCTERIS* PETERS.

Rhynchonycteris, the name applied to a genus of Emballonurine bats, by Peters in 1867*, is preoccupied by *Rhinchonycteris* Tschudi 1844–46†, a synonym of *Anoura*. The earlier name *Proboscidea* proposed by Spix in 1823‡ and recently used by Allen§ is similarly invalidated by the *Proboscidea* of J. G. Brugière, 1791‖. In the absence of any other published name, the genus, type *Vespertilio naso* Wied, may be known as *Rhynchiscus*. —*Gerrit S. Miller, Jr.*

A SPECIMEN OF *BISON OCCIDENTALIS* FROM NORTHWEST CANADA.

Examples of *Bison occidentalis* are as yet so rare in collections that an additional one is perhaps worthy of record. Among some specimens of recent large mammals received by the Biological Survey from Charles Sheldon, of New York, is an incomplete skull of a fossil bison, which seems referable to *Bison occidentalis*. It was found by Indians in the cut banks of a small creek which enters the Pelly River some twelve miles above Selkirk, Yukon Territory. The nasals, rostral region, palate, and teeth are missing, but the cranium, orbit, and horn cores are well preserved. Measurements of the horn cores are as follows: Vertical diameter, 105; transverse diameter, 105; circumference at base, 312; length on upper curve, 223; length on lower curve, 285; extent from tip to tip, 660. The length of the horn cores is rather less than in previous specimens referred to this species, but otherwise no serious discrepancies appear. For confirming my identification, I am indebted to F. A. Lucas, the original describer of the species. —*Wilfred H. Osgood.*

AN EXTENSION OF THE RANGE OF THE WOOD TORTOISE.

The capture of an individual of the wood tortoise (*Chelopus insculptus*) August 19, 1906, on the Maryland shore of the Potomac, near Plummers Island, about 10 miles west of Washington, D. C., possesses some interest as it appears to mark the extreme southern limit of the species, Havre de Grace, as indicated by one specimen in the collection of the National Museum, being the previous southernmost record. The specimen in question has been added to the National Museum collection.

—*H. W. Henshaw.*

* Monatsber k. preuss. Akad, Wissensch., Berlin, p. 477.
† Fauna Peruana, p. 71.
‡ Simiarum et Vesp. Brasil. Spec. Nov. p. 61.
§ Bull. Amer. Mus. Nat. Hist., XX, p. 343, October 8, 1904.
‖ Ency. Méth., Vers. Intestins, p. 96.

BUFFON'S "PORC-ÉPIC DE MALACA."

In the "General Notes" of December 31 Mr. Lyon repeats the assertion, first made by Dr. Jentink, that Buffon's "Porc-épic de Malaca," on which hangs *Hystrix fasciculata* Shaw, is a member of the genus *Trichys*, and not an *Atherurus* as was formerly supposed.

But this reference to *Trichys* is, I believe, quite erroneous, and I regret that I did not earlier publish the notes I have on the subject, so as to prevent the repetition of this mistake.

Firstly, Buffon's animal was said to come from Malacca, where *Atherurus* is common and *Trichys* is as yet unknown.

Secondly, "rognures de parchemin" to which the flattened terminal tail bristles are said to be similar need not be translated *strips* of parchment, but rather "parings" or "clippings," words quite as applicable to the beaded bristles of *Atherurus* as to the parallel-sided ones of *Trichys*. It is the undue importance attached to Shaw's translation "*strips* of parchment" which has misled previous writers on the matter.

But the truth is readily shown by the following comparative characters:

Buffon's Figure.	*Atherurus.*	*Trichys.*
Back profusely covered with long whiskers.	With numerous long dorsal bristles.	No bristles, or a few inconspicuous ones.
Naked part of tail about equal in length to tuft.	Proportion as in figure.	Tufted part of tail about $\frac{1}{3}$ of naked part.
Tuft large and bushy.	Tuft large.	Tuft small and thin.
Buffon's Description.		
Tail about $\frac{1}{3}$ of body.	Tail, *with tuft*, about $\frac{1}{2}$ of body.	Tail, $\frac{2}{3}$–$\frac{3}{4}$.
"Piquans blancs à la pointe."	Spines prominently white-tipped.	Spines all brown.

It will therefore be seen that the proportions of the tail and its terminal tuft, the color of the spines, and the locality, all point definitely to *Atherurus* and not to *Trichys*, while the "rognures de parchemin" phrase is just as applicable to one as to the other.

Neither this nor any other of Buffon's figures is sufficiently accurate in details to permit of importance being attached to the shape of the terminal caudal bristles as shown in the illustration itself.

My determination is therefore in accordance with that made by the two Cuviers, who may have actually examined and described the specimen figured by Buffon.

The present correction is of importance with regard to the nomenclature of the species of *Trichys*, but *Hystrix fasciculata* Shaw, proving to be a synonym of *H. macroura* Linn., the latter is still none the less the type of the genus *Atherurus*. —*Oldfield Thomas.*

Vol. XX, pp. 67-70 June 12, 1907

PROCEEDINGS

OF THE

BIOLOGICAL SOCIETY OF WASHINGTON

ON THE COMPOSITION AND DECOMPOSITION OF FRESH WATER MUSSEL SHELLS WITH NOTES AND QUERIES.

BY ROBERT E. C. STEARNS.

Thirty years ago, more or less, during my connection with the University of California, there came to hand from some forgotten source, a number of the common West Coast fresh-water mussels *Anodonta nuttalliana*. I was about to discard the soft parts when it occurred to me it would be better to keep the mussels alive with the possibility of learning something of their habits or behavior. Accordingly they were placed in improvised aquaria, and the water renewed every day. My time was so closely occupied with various duties that daily renewal of the water was about all the attention they received. In one instance through oversight, the water became stale and the mussels died, so the jar and its contents were placed outside the house. In a short time the soft parts became putrid and soon after the enclosing shell also; gradually dissolving like ordinary glue, leaving nothing but two thin, fragile discoid scales of lime, something less in size than a half-dollar, the remains of the two valves. The proportion of limy to membraneous or animal matter, was so exceedingly small as to be noteworthy.

As all of the so-called species of *Anodonta* that occur in the Columbia and Sacramento drainage basins, with the possible exception of *A.* (*Gonidea*) *angulata*, belong to the group of which the widely distributed *A. cygnea* is the type, it may fairly be assumed that the proportion of animal to mineral matter in the shells (or valves) as observed in *A. nuttalliana*, is the same or about the same in the other species here, there and everywhere classed with *cygnea*.

The small proportion of limy to animal matter is conspicuously exhibited in the tendency of the thin *Anodonta* shells to crack through the shrinking of the periostracum, not infrequently fracturing a specimen beyond repair.

These proportions of lime and animal matter (to use simple language), are apparently reversed when the shells of *Unio* are compared with those of *Anodonta*.

Dr. Philip Carpenter, writing nearly fifty years ago, with the Fresh-water Mussels of the Mississippi drainage in mind, remarked: "In no other known portion of the earth is there so large an area covered with soluble limestone. The water of the rivers being saturated with this would be unfit for many of its uses, were it not for the immense development of this group of heavy shells. The North American Unios may be regarded as so many water-filters absorbing the lime from the water, and preserving it from re-absorption by their strong, horny skins."*

These few lines suggest the following questions:

First. Is the nearly absolute lack or absence of the *Unio* form in the drainage basins of the Columbia and Sacramento rivers probably, or measurably, due to a smaller proportion of lime in the waters of said basins, as compared with the Mississippi waters?

Second. Is there a corresponding discrepancy or absence of the *Anodonta* form in the Mississippi basin?

To the latter query only one answer is possible.

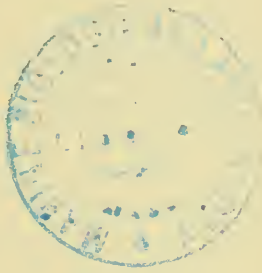
Turning back to the *A. cygnea* group and the consideration of the wide dispersion of *cygnea* we find a companion in its extraordinary range of distribution in *Margaritana margaritifera*. This wide distribution is not only geographic in the ordinary sense but hypsometric also, and this companionship includes the West American forms observed in the Columbia and Sacramento basins.

While inhabiting the same waters, though not as heavy as many of the Unios of a corresponding size, the proportion of limy to animal matter is much greater than in the thin-shelled Anodons herein mentioned.

The coincident distribution of these two forms suggests something more than an unrelated and isolated fact.

* The presumed unfitness of the water of the rivers for many of its uses, being neutralized by the Unios, etc., may be regarded as somewhat fanciful.

The late Dr. Cooper* regarded the West Coast mussels, *Anodonta wahlametensis*, *A. oregonensis* and *A. californiensis* as varieties of *A. nuttalliana*, the last named being the first in order of description and publication by Dr. Lea in his Observations, etc., thus endorsing my conclusions as previously published in 1882.† Whether Dr. Lea's species and Dr. Trask's *A. triangularis* and *A. rotundata* are simply mutations of *nuttalliana* or otherwise, it is not necessary to discuss at the present moment. These and numerous undescribed mutations occur in a multitude of localities, often in great abundance, in the above-named Western basins and their tributaries, alike in running or still waters, subject to various environmental conditions.



* Catalogue of West American and many Foreign Shells, etc., printed for the State Mining Bureau, April, 1894, Sacramento, State Printing Office, 1894.

† On the History and Distribution of the Fresh Water Mussels, and the Identity of Certain Alleged Species. Proc. California Academy of Sciences, November 20, 1882.

Vol. XX, pp. 71-74 June 12, 1907

PROCEEDINGS

OF THE

BIOLOGICAL SOCIETY OF WASHINGTON

NOTES ON THE MAMMALS OF SOUTHWESTERN MISSOURI.

BY HARTLEY H. T. JACKSON.

The brief notes which follow are intended only as preliminary notes on the mammals of southwestern Missouri. Duty in other directions than field work prevented a full and comprehensive study of the fauna of this much neglected section of our country. The author hopes, in the near future, to continue his research in this district, and at such time a more complete list with more elaborate annotations will be published.

Didelphis virginiana Kerr.

OPOSSUM.

Opossums are common along the osage hedges and in the scattering timber along the creeks. It as frequently dwells in holes in the ground as in cavities of trees or in hollow logs, and may occasionally be encountered well out upon the prairies, especially if there be a few persimmon trees in the vicinity. During late summer and early autumn the opossum sometimes visits the henhouse, evidently more for the purpose of obtaining eggs than for chickens.

Sciurus carolinensis Gmelin.

GRAY SQUIRREL.

Gray squirrels are common in the timber along the creeks and rivers. They seem to prefer mixed groves of sycamore and hickory, dwelling in the cavities of the former and feeding upon the nuts of the latter. They are very erratic in occurrence, being found in abundance in a given locality for a few years, then entirely disappearing to reappear in another locality. No melanistic individuals were seen.

Sciurus niger rufiventer Geoffroy.

FOX SQUIRREL.

Sciurus n. rufiventer is not as common as *Sciurus carolinensis*, but is much more regular in distribution. Fox squirrels are generally confined to oak woods among the higher ranges of hills.

Sciuropterus volans subsp.

FLYING SQUIRREL.

Having seen only one flying squirrel in the district, and not having captured that one, I am unable to refer it subspecifically. However, the rusty suffusion on the ventral surface of the tail and the dusky feet may indicate the subspecies *querceti*. The squirrel, which was closely observed, was driven from a woodpecker's hole in an old sycamore stub on the bottoms at Lakeside in Jasper County.

Tamias striatus venustus Bangs.

CHIPMUNK.

A single chipmunk taken among the wooded hills eight miles south of Carthage proves to be *Tamias s. venustus*. This specimen, a female, taken November 4, 1905, measures as follows: Total length, 218 mm.; tail vertebrae, 78.5 mm.; hind foot, 33.2 mm.

At Lakeside, Jasper County, October 15, 1904, three chipmunks were seen gathering acorns and hickory nuts along the rocky, wooded bank of Center Creek in Lakeside Park. Again on May 11, 1905, near the same locality, a *Tamias* was seen running from one hole to another on a steep, rocky bank not more than four feet above water.

Chipmunks are said to occur around Webb City.

Mus musculus Linnaeus.

HOUSE MOUSE.

This little pest is as abundant as it is useless. House mice are found not only in the towns but along every country road and hedge. I have caught them in weed patches upon the open prairie a mile from any building.

Mus norvegicus Erxleben.

NORWAY RAT.

The common brown rat of the barns and granaries, unlike the house mouse, is confined chiefly to the vicinity of human habitations. Much less generally distributed than in the northeastern States and not such a nuisance; nevertheless they are rapidly increasing in numbers.

Peromyscus michiganensis (Audubon and Bachman).

PRAIRIE WHITE-FOOTED MOUSE.

This is a common mouse of the fields and is exceeded in abundance only by *Microtus ochrogaster*. It favors patches of open brush-land but on one occasion a young male was captured under a log in heavy timber high up on a hill. Specimens taken are very nearly typical *michiganensis* with scarcely an approach towards *pallascens*. Average measurements of three males: Total length, 139.7 mm.; tail vertebrae, 52 mm.; hind foot, 17 mm. Average of two females: Total length, 143 mm.; tail vertebrae, 57 mm.; hind foot, 19 mm.

Other forms of the genus *Peromyscus* probably occur but none were taken.

Reithrodontomys intermedius Allen.

HARVEST MOUSE.

The geographical range of this harvest mouse has generally been given as, "Southern Texas from Corpus Christi southward; Rio Grande Valley to mouth of Pecos, and east to Kerr, Bexar and Bee counties. South into Mexico. Inhabits Lower Sonoran Zone."

In view of the fact that this mouse had never been recorded from the United States outside of Texas, I was somewhat surprised to find that I had four fairly typical specimens from Carthage, Jasper County, Missouri. I am indebted to Mr. W. H. Osgood, of the United States Biological Survey, for identifying them. These specimens were all taken during the autumn of 1904 and measured as follows: Adult male, total length, 154.5 mm.; tail vertebrae, 83 mm.; hind foot, 21.2 mm. Adult female (average of two), total length, 167 mm.; tail vertebrae, 93.2 mm.; hind foot, 20.8 mm. Immature female, total length, 132 mm.; tail vertebrae, 76.7 mm.; hind foot, 21.2.

Reithrodontomys intermedius is found in grassy and weedy orchards, or upon the open prairie, especially where there is a scattering growth of scrub trees. A favorite habitat is a grassy patch where an old wheat stack has once stood. All the specimens taken were trapped in holes under stumps and at no time were nests observed in the open in trees or in bushes.

Microtus ochrogaster (Wagner).

PRAIRIE VOLE.

The prairie meadow vole is undoubtedly the most abundant mammal in southwestern Missouri. It is found in every grassy tract of land and is evidently at home both near the streams and on the prairies. Specimens taken, with one exception, do not differ essentially from those taken in Wisconsin. A male taken March 4, 1905, is much grayer than typical specimens and approaches *haydeni* in color but its cranial characteristics are in keeping with *ochrogaster*. Four males average: Total length, 147.6 mm.; tail vertebrae, 30.7 mm.; hind foot, 20.2 mm. Three females average: Total length, 145.6 mm.; tail vertebrae, 33.7 mm.; hind foot, 21.5 mm.

Fiber zibethicus (Linnaeus).

MUSKRAT.

Muskrats are not uncommon along the streams, where they live in holes in the banks. Though the mercury sometimes reaches the zero mark, I have never known the muskrats to build nests in the region.

Lepus texianus melanotis Mearns.

JACK RABBIT.

Lepus t. melanotis is not rare in the prairie regions of Jasper County. It probably does not extend to the southward, for the region there is more wooded and hilly. A typical specimen of *Lepus t. melanotis* was taken November 24, 1904, on the eastern border of Jasper County. Jack rabbits are said by the natives here not to occur east of White Oak Creek. This creek lies one-half mile east of the locality from which this specimen was taken, and is close to Lawrence County. The statement is undoubtedly

correct, as the country east of White Oak Creek is very rough and partly wooded. May 25, 1905, a large *Lepus t. melanotis* was seen from a train in an old pasture about two miles north of Sheldon, Missouri.

This rabbit is confined almost entirely to the prairies; a favorite resort for the species is a wheat stubble field where it will sit motionless for hours unless disturbed. It is seldom found in tall grass, but selects a field with a low growth and with an occasional bunch of taller grass, behind which it rests, sheltered from the wind.

The flesh of *Lepus t. melanotis* is relished by the negroes, but white people of the locality seldom eat it; they fear that jack rabbits are infested with disease germs. This fear or superstition originated in the fact that this species frequently has abscesses or boils just beneath the skin, particularly in the vicinity of the sacrum. Possibly this is the source of the epidemic which occasionally breaks out in the genus *Lepus*.

The specimen above mentioned, a female, measured: Total length, 584 mm., tail vertebrae, 67 mm., hind foot, 131 mm.; ear from crown, 134 mm.

Vulpes fulvus (Desmarest).

RED FOX.

Red foxes are occasionally captured in the region and frequently seen. The writer saw one on the morning of November 7, 1905, chased by dogs through the business district of Carthage.

Procyon lotor (Linnaeus).

RACCOON.

Raccoons are very common in the heavy timber along the creeks and rivers. They are especially abundant in the bottom-lands along the White River.

Blarina brevicauda (Say).

SHORT-TAILED BLARINA.

One specimen of *Blarina brevicauda* was taken at Carthage. This one, a female, had eaten a large *Reithrodontomys* which had been caught in a trap; the trap was reset and the blarina captured while I was watching. The specimen averages a trifle smaller than typical *brevicauda*. Measurements: Total length, 106 mm.; tail vertebrae, 21.5 mm.; hind foot, 14.5 mm.

Blarina parva (Say).

SMALL BLARINA.

A pair of *Blarina parva* was trapped in an old orchard near Carthage. They are typical in every respect. Measurements: Male, total length, 76 mm.; tail vertebrae, 16 mm.; hind foot, 11.5 mm.; Female, total length, 74 mm.; tail vertebrae, 18.5 mm.; hind foot, 11.3 mm.

Scalopus aquaticus machrinus (Rafinesque).

PRAIRIE MOLE.

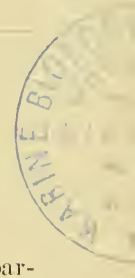
This species is comparatively common over the whole of Jasper County, where its ridges may be seen in almost any field, garden or orchard. Two males were taken which are nearly typical *Scalopus a. machrinus;* however these have a coppery green shade over the back, a tendency towards *Scalopus aereus* Bangs. The two specimens average: Total length, 168 mm.; tail vertebrae, 30 mm.; hind foot, 23 mm.

Vol. XX, pp. 75-80 July 22, 1907

PROCEEDINGS

OF THE

BIOLOGICAL SOCIETY OF WASHINGTON



DESCRIPTIONS OF TEN NEW KANGAROO RATS.

BY C. HART MERRIAM.

The collections of the Biological Survey contain ten apparently undescribed species and subspecies of kangaroo rats from California and Mexico—the latter collected by E. W. Nelson and E. A. Goldman, mainly in the course of their recent explorations on the peninsula of Lower California. Of the 10 new forms, 6 belong to the genus *Dipodomys* and 4 to the genus *Perodipus*.

In working out the ranges of the various species of the group I am indebted to Mr. E. A. Goldman for helpful assistance.

Following are descriptions of the new forms:

Dipodomys spectabilis cratodon subsp. nov.

Type from Chicalote, Aguas Calientes, Mexico. No. 78,953 ♂ ad., U. S. National Museum, Biological Survey Collection. Collected July 2, 1896, by E. W. Nelson and E. A. Goldman. Orig. No. 9734.

Characters.—Similar in general to *spectabilis* but skull larger—largest of the genus—more massive, deeper vertically, with broader rostrum and premaxillæ, narrower interparietal area, and *much broader and heavier incisors.*

Measurements.—Type specimen (♂ ad.): total length, 342; tail vertebræ, 217; hind foot, 54. Average of 9 from type locality: total length, 337; tail vertebræ, 208; hind foot, 52.5.

Dipodomys nelsoni sp. nov.

Type from La Ventura, Coahuila, Mexico. No. 79,439, ♂ ad., U. S. National Museum, Biological Survey Collection. Collected Aug. 10, 1896. Nelson and Goldman. Original No. 9998.

Range.—From Santa Rosalia, Chihuahua, to Jaral and La Ventura, Coahuila, and thence to Dr. Arroyo, Nuevo Leon.

Characters.—Much smaller than *spectabilis* and very much larger than *phillipsi* group. (41 x 27 skull.) Similar to *spectabilis* in general form and massiveness of skull but much smaller.

Mastoids large; interparietal area small; mastoids actually nearly as large—relatively larger—than in *spectabilis;* zygomata not so squarely or

broadly spreading outward as *spectabilis;* maxillary arch moderate, with well developed angle (often "hooked"); color paler, grizzled buffy, most intense on flanks and rump, with vinaceous tinge; white tip of tail shorter (20 mm.) or absent altogether; distal ½ of upper surface black and tufted; lateral white tail stripes reaching about ⅔ length of tail.

Measurements.—Type specimen (♂ ad.): total length, 330; tail vertebræ, 204; hind foot, 50. Average of 10 from type locality: total length, 318; tail vertebræ, 197; hind foot, 48.5.

Dipodomys platycephalus sp. nov.

Type from Calmalli, Lower California, Mexico. No. 139,882, ♂ ad., U. S. National Museum, Biological Survey Collection. Collected Oct. 1, 1905, by E. W. Nelson and E. A. Goldman. Original No. 18,248.

Range.—Western Lower California from San Andres south to Santa Domingo and easterly over the arid desert to Calmalli.

Characters.—Similar externally to *merriami simiolus* but skull peculiar.

Color.—Ground color ochraceous buff moderately lined with dark hairs; ankle same color (not dusky).

Cranial characters.—Skull in general like that of *merriami* but *extraordinarily broad;* maxillary arches of zygomata broadly and squarely spreading* (as in *Perodipus streatori*); frontoparietal shield exceedingly broad; interparietal area broad; mastoid bullæ normal.

Remarks.—So far as now known, *D. platycephalus* has only one near relative, *insularis*, from San José Island on the Gulf side of Lower California. It differs from *insularis* externally in being darker (more liberally intermixed with black hairs) and having the tail crest more sooty (instead of brownish).

The young (from San Andres) are decidedly darker than young from San José Island.

The skull differs from that of *insularis* in larger size, much broader frontoparietal shield, and decidedly larger mastoid bullæ.

Measurements.—Type specimen (♂ ad.): total length, 238; tail vertebræ, 145; hind foot, 38. Skull of type: occipito-nasal length, 34; breadth across mastoids, 23.5; lateral spread of maxillary arches, 21.

Dipodomys margaritae sp. nov.

Type from Margarita Island, Lower California. No. 146,058, ♂ yg. ad., U. S. National Museum, Biological Survey Collection. Collected Dec. 1, 1905, by Nelson and Goldman. Original No. 18,711.

Range.—Margarita Island.

Characters.—Size very small (nearly as small as *exilis*); color pale pinkish buff almost ochraceous buff, moderately lined with dark hairs. Tail crest small and weak; under-stripe continuous; lateral white stripes reaching nearly to tip of vertebræ. Ground color similar to *arenivagus* but less pure—obscured by intermixture of dark hairs.

Skull.—Very small and light with slender rostrum and nasals, remarkably small bullæ, rather broad frontoparietal shield and intermastoid,

* The most broadly spreading maxillary arches are in No. 139,870, from San Andres.

rather squarely spreading (but short) anterior arm of zygomata, *broad* and strongly angled maxillary arch, and broad frontoparietal shield.

Skull short, same size as *parvus* and most like *parvus*, from which it differs *markedly* in smaller and less inflated mastoid bullæ (especially rear section which does not project so far posteriorly), and less conspicuously in longer nasals, longer (and slightly broader) maxillary arches, which stand out more squarely. Both have rather broad frontoparietal shields and interparietals. Clearly belong to same group although color difference great.

Remarks.—D. margaritae requires comparison with only one known species, *parvus*, its small size (skull 33.5 x 22) alone being sufficient to distinguish it from all others except *exilis*, and its bullæ are smaller even than those of *exilis*.

Measurements.—Type specimen (♂ yg. ad.): total length, 234; tail vertebræ, 144; hind foot, 38. Average of 3 specimens from type locality: total length, 240; tail vertebræ, 149; hind foot, 38.2.

Dipodomys insularis sp. nov.

Type from San José Island, Gulf of California, off Lower California, Mexico. No. 79,053, ♀ ad., U. S. National Museum, Biological Survey Collection. Collected Aug. 6, 1895, by J. E. McLellan. Orig. No. 1457.

Characters.—Size small; color pale pinkish buff only lightly lined with dark hairs; nose and whisker patches only faintly developed.

Color.—Ground color pinkish buff with vinaceous tinge on rump and flanks, as in *margaritae*. Compared with *melanurus* from the mainland of the Cape region: color very much paler and of different tone; crested part of tail paler and less strongly crested; ears larger. Compared with *platycephalus:* general color paler; tail crest browner. The young are decidedly paler than young of *platycephalus*.

Cranial characters.—Skull small but rather broad, with very broad maxillary arches. Compared with *platycephalus* the skull is smaller; frontoparietal shield much narrower; mastoid bullæ decidedly smaller.

Measurements.—Type specimen (♀ ad.): total length, 243; tail vertebræ, 143; hind foot, 39. Average of 5 specimens from type locality: total length, 249; tail vertebræ, 146; hind foot, 39.6.

Dipodomys merriami kernensis subsp. nov.

Type from Onyx, west end of Walker Pass, Kern Co., Calif., No. 108,884, ♂ ad., U. S. National Museum, Biological Survey Collection. Collected July 25, 1901, by W. K. Fisher. Orig. No. 2106.

Characters.—Size small; color pale ochraceous buff, as in *nevadensis*, moderately lined with dark hairs; under tail stripe hardly continuous to tip but probably continuous in fresh pelage; nose and whisker spots nearly obsolete; sides of face, nearly white, reaching from sides of nose to eye and covering cheeks (under eye); thigh patch ochraceous buff to heel. Ear as in *nevadensis*.

Cranial characters.—Skull small and square, with small mastoids,

broadly and squarely spreading maxillary roots of zygomata, broad and strongly angled (almost hooked) maxillary arches, and long nasals. Compared with *neradensis* and *nitratoides* (with which it agrees most closely): frontoparietal shield broader; skull broader across mastoids; maxillary roots of zygomata more broadly and squarely spreading; mastoids somewhat smaller (narrower) though posterior segment is fully inflated; nasals long, as in *neradensis*—decidedly longer than in *nitratoides*.

Measurements.—Type specimen, (♂ ad.): total length, 240; tail vertebrae, 140; hind foot, 37. Skull: greatest length, 34.5; occipito-nasal length, 32.5; mastoid breadth, 22.5; maxillary breadth, 20.

Perodipus stephensi sp. nov.

Type from San Jacinto Valley, Riverside County, Calif., No. $\frac{1808}{23440}$ ♂ ad., Merriam Collection. Collected Nov. 27, 1885, by Frank Stephens.

Characters.—Very distinct from all other species except *streatori* and *panamintinus* both of which it resembles in the general squarish form of the skull. Ears moderate, about as in *panamintinus*—smaller than in *agilis*.

Color.—Similar to *panamintinus* but darker.

Cranial characters.—General form of skull "squarish" as in *streatori* and *panamintinus;* frontoparietal shield broadly "squarish" (contrasted with wedge-shaped); maxillary root of zygomata broadly and squarely spreading; maxillary arch broad and strongly angled. Compared with *panamintinus* (probably its nearest relative) the skull is slightly smaller; the interparietal area and basioccipital decidedly narrower; rostrum and nasals slightly smaller and more slender; mastoid bullae slightly fuller and deeper (best seen from behind).

Compared with *streatori* (which it resembles surprisingly in general form and size) the interparietal area averages narrower; outer angle of parietal more produced, giving the cranial shield greater breadth posteriorly; mastoid bullae fuller and deeper vertically (best seen from behind); incisors weaker.

Perodipus morroensis sp. nov.

Type from Morro, San Luis Obispo Co., Calif., No. $\frac{31626}{13199}$ ♀ ad., U. S. National Museum, Biological Survey Collection. Collected Nov. 11, 1891, by E. W. Nelson. Orig. No. 1464.

Characters.—A dark, highly colored form resembling *simulans* externally except that the ear is smaller and nose bar blacker. Ears dark; nose spot jet black and continuous, with black whisker patches; back darkest, with faint olivaceous tinge; front of face (eyes to nose) grizzled buffy and dusky, much paler than top of head and back; thigh patches mixed with dusky and becoming black on ankles. Similar in general to *agilis* but ears somewhat smaller; color slightly darker, particularly on sides of head below ears and on end of nose (which is black and connects with whisker patches, thus forming a black bar across front of face); thigh patch darker and passing posteriorly into sooty black.

Cranial characters.—Skull similar in general to that of *agilis* but slightly smaller; frontoparietal shield more wedge-shaped (less squarish); *maxillary arch much broader and with angle strongly developed* as in *streatori* (in *agilis* the angle is weak and rounded); mastoids smaller and flatter—less deep vertically; occipital part of mastoid more ridged (less swollen); incisors more slender.

Measurements.—Type specimen (♀ ad.): total length, 300, tail vertebræ, 182; hind foot, 45. Average of 5 specimens from type locality: total length, 292; tail vertebræ, 177; hind foot, 44.

Perodipus perplexus sp. nov.

Type from Walker Basin, Kern Co., Calif., No. $\frac{29261}{41328}$ ♂ ad., U. S. National Museum, Biological Survey Collection. Collected July 15, 1891, by Vernon Bailey. Orig. No. 3053.

Range.—Foothills and small interior valleys of the southern Sierra and Tejon Mountains from Walker Basin to Tejon Pass.

Characters.—Ears large as in *agilis*, strikingly larger than in its neighbor *streatori;* color as in *agilis*, but sides of face from eye to whisker patch broadly whitish, leaving a comparatively narrow median band of body color reaching down from eyes to nose; dark tip of nose less marked.

Cranial characters.—Skull squarish and rather small, with broad frontals and well developed post-lachrymal angle as in *agilis*. Differs from *agilis* in slightly larger size; slightly larger incisors; maxillary arch broader at base (along fronto-maxillary suture); tympanic capsule rather short and more inflated anteriorly.

Measurements.—Type specimen (♂ ad.): total length, 320; tail vertebræ, 195; hind foot, 46. Average of 5 specimens from type locality (not fully adult): total length, 307; tail vertebræ, 183; hind foot, 44. Average of four specimens from Tejon Pass (not fully adult): total length, 307; tail vertebræ, 185; hind foot, 44.9.

Perodipus simulans peninsularis subsp. nov.

Type from Santo Domingo, Lower California, Mexico. No. 139,872, ♂ yg. ad., U. S. National Museum, Biological Survey Collection. Collected Sept. 27, 1905, by Nelson and Goldman. Orig. No. 18,215.

Characters.—Similar in general to *simulans* but considerably larger, tail crest more strongly developed, pelage more silky, ground color much paler and of a different tint, and skull somewhat different.

Color.—Ground color pale buff only lightly lined with dark hairs; nose patch small and not connected with whisker-marks.

Cranial characters.—Skull like that of *simulans* but maxillary arch slightly narrower, with angle less pronounced; mastoids slightly larger and deeper; interparietal area narrower.

Measurements.—Type specimen (♂ yg. ad.): total length, 312; tail vertebræ, 203; hind foot, 45. Average of 3 from type locality (all but the type immature and slightly undersize): total length, 302; tail vertebræ, 191; hind foot, 43.5.

Vol. XX, pp. 81-84 July 22, 1907

PROCEEDINGS

OF THE

BIOLOGICAL SOCIETY OF WASHINGTON

DESCRIPTIONS OF NEW NORTH AMERICAN RABBITS.

BY E. W. NELSON.

Study of the great series of North American rabbits in the National Museum (mainly in the Biological Survey Collection) reveals the existence of several previously unrecognized species and subspecies. As considerable time must elapse before publication of my monograph on the group I have thought it advisable to publish the new forms in advance. The present paper includes a new Jack Rabbit and several Cottontails.

In this connection I wish to acknowledge my indebtedness to Dr. C. Hart Merriam for the opportunity to monograph this interesting group after he had devoted considerable time to its study with the same object in view. I am under obligation also to Mr. N. H. Hollister, Assistant in the Biological Survey, for help in arranging and comparing the great mass of material in the National Museum Collections.

All measurements are in millimeters.

Genus LEPUS Linn.

Lepus californicus magdalenæ subsp. nov.

MAGDALENA ISLAND JACK RABBIT.

Type No. 146,168, adult male, U. S. National Museum (Biological Survey Collection), from Magdalena Island, Lower California, Mexico; collected by E. W. Nelson and E. A. Goldman, November 26, 1905.

Geographic distribution.—Magdalena and Margarita Islands, Lower California, Mexico.

Subspecific characters.—Upperparts brownish buffy, most like *L. c. xanti* but paler, with a lighter wash of black on back; front of ears grayer and back of ears, especially on basal half, much whiter; ears decidedly shorter.

Measurements of type.—Total length, 550; tail vertebræ, 92; hind foot, 117; length of ear from notch in dried skin, 94.

GENUS SYLVILAGUS GRAY.

Sylvilagus cognatus sp. nov.
MANZANO MOUNTAIN COTTONTAIL.

Type No. 136,569, adult, U. S. National Museum (Biological Survey Collection), from 10,000 feet altitude, near the summit of Manzano Mountains, New Mexico; collected by A. Rea, February, 1905.

Geographic distribution.—Higher slopes of the mountains of central and eastern New Mexico.

Specific characters.—General color pale slightly buffy gray like *S. robustus* but smaller with smaller skull, much smaller bullæ and slenderer supraorbitals.

Measurements of type.—Total length, 390; hind foot, 100; length of ear from notch, 69 (all the foregoing measurements are from the dry skin).

Sylvilagus floridanus similis subsp. nov.
NEBRASKA COTTONTAIL.

Type No. 69,517, adult male, U. S. National Museum (Biological Survey Collection), from Valentine, Nebraska; collected by C. P. Streator, November 10, 1891.

Geographic distribution.—Western border of Minnesota, eastern border of the Dakotas, Nebraska and the northeastern quarter of Colorado.

Subspecific characters.—A pale, gray form like *mearnsi* but smaller and distinctly paler.

Measurements of type.—Total length, 410; tail vertebræ, 61; hind foot, 100; length of ear from notch in dried skin, 51.

Sylvilagus floridanus restrictus subsp. nov.
MICHOACAN COTTONTAIL.

Type No. 33,687, adult male, U. S. National Museum (Biological Survey Collection), from Zapotlan, Jalisco, Mexico; collected by E. W. Nelson, April 25, 1892.

Geographic distribution.—Mainly in the pine and oak forests of the Sierra Madre in the States of Michoacan, southern and western Jalisco and the southeastern part of the Territory of Tepic, Mexico.

Subspecific characters.—Similar in size to *S. f. subcinctus* but decidedly more rusty reddish (almost as in *azteeus*) with legs much brighter rufous than in any other form of *floridanus* on the Mexican tableland.

Measurements of type.—Total length, 425; tail vertebræ, 55; hind foot, 94; length of ear from notch in dried skin, 58.

Sylvilagus auduboni vallicola subsp. nov.
SAN JOAQUIN COTTONTAIL.

Type No. $\frac{31257}{43122}$, adult female, U. S. National Museum (Biological Survey Collection), from San Emigdio Ranch, Kern County, California; collected by E. W. Nelson, October 22, 1891.

Geographic distribution.—Mainly in the southern two-thirds of the San Joaquin and adjacent connected valleys, central California.

Subspecific characters.—Size about as in true *auduboni* but ears much larger and color of upperparts paler and more yellowish buffy brownish; bullæ larger, jugals slenderer.

Measurements of type.—Total length, 375; tail vertebræ, 73; hind foot, 88; length of ear from notch in dried skin, 68.

Sylvilagus auduboni cedrophilus subsp. nov.
CEDAR BELT COTTONTAIL.

Type No. 148,287, adult female, U. S. National Museum (Biological Survey Collection), from Cactus Flat, twenty miles north of Cliff, New Mexico; collected by Vernon Bailey, November 6, 1906.

Geographic distribution.—Mainly in the cedar and pinyon pine belt of the southern two-thirds of New Mexico and eastern border of Arizona.

Subspecific characters.—Larger and much richer and darker buffy than *S. a. minor;* underside of neck usually rich ochraceous buffy.

Measurements of type.—Total length, 385; tail vertebræ, 35; hind foot, 92; length of ears from notch in dried skin, 66.

Sylvilagus auduboni neomexicanus subsp. nov.
NEW MEXICO COTTONTAIL.

Type No. 118,477, adult male, U. S. National Museum (Biological Survey Collection), from Fort Sumner, New Mexico; collected by J. H. Gaut, September 23, 1902.

Geographic distribution.—The Pecos Valley, New Mexico, and thence into the adjacent parts of western Texas and north through western Oklahoma to the central southern border of Kansas.

Subspecific characters.—Size about as in *S. a. minor* but ears shorter, bullæ smaller and color much more rusty buffy, or rusty reddish.

Measurements of type.—Total length, 385; tail vertebræ, 59; hind foot, 91; length of ears from notch in dried skin, 58.

Sylvilagus auduboni warreni subsp. nov.
COLORADO COTTONTAIL.

Type No. 148,632, adult female, U. S. National Museum (Biological Survey Collection); from Coventry, Colorado; collected by C. H. Smith, January 4, 1907.

Geographic distribution.—Southwestern Colorado and adjacent parts of Utah, New Mexico and Arizona.

Subspecific characters.—Similar to *baileyi* in size, length of ears and abundant pelage but darker colored with more distinct gray rump patch and darker rufous on nape and legs.

Measurements of type.—Total length, 375; tail vertebræ, 51; hind foot, 102; length of ears from notch in dried skin, 70.

Sylvilagus mansuetus sp. nov.
SAN JOSÉ ISLAND BRUSH RABBIT.

Type No. 79,041, adult male, U. S. National Museum (Biological Survey

Collection), from San José Island, Gulf of California, Mexico; collected by J. E. McLellan, August 2, 1895.

Geographic distribution.—San José Island, Gulf of California, Mexico.

Specific characters.—Size of *Sylvilagus bachmani cinerascens;* ears larger and color much paler.

Measurements of type.—Total length, 339; tail vertebræ, 44; hind foot, 73; length of ears from notch, in dried skin, 63.

Sylvilagus bachmani exiguus subsp. nov.

LOWER CALIFORNIA BRUSH RABBIT.

Type No. 139,607, adult male, U. S. National Museum (Biological Survey Collection), from Yubay, central Lower California, Mexico; collected by E. W. Nelson and E. A. Goldman, September 19, 1905.

Geographic distribution.—The arid middle part of the Peninsula of Lower California, Mexico.

Subspecific characters.—Similar in size to *cinerascens* but differs from that form in its much longer ears, larger bullæ and well marked gray rump patch.

Measurements of type.—Total length, 315; tail vertebræ, 32; hind foot, 68; length of ears from notch in dried skin, 64.

Vol. XX, pp. 85-86 December 11, 1907

PROCEEDINGS

OF THE

BIOLOGICAL SOCIETY OF WASHINGTON

A COLORADO RECORD FOR *CALLOSPERMOPHILUS WORTMANI*, WITH NOTES ON THE RECENT CAPTURE OF *ANTROZOUS PALLIDUS*.

BY MERRITT CARY.

Additional work on the distribution of Colorado mammals, carried on during the field season of 1907 by the Biological Survey, shows that the pale bat (*Antrozous pallidus*) is a resident of the low Upper Sonoran valleys in the extreme southwestern part of the State. Although this species was taken once in Colorado over thirty years ago, no subsequent notice of its occurrence in the State has appeared, so its recent discovery seems worthy of record.

A critical examination of a small series of *Callospermophilus* secured in northwestern Colorado in 1906 discloses the fact that a specimen from the Snake River Valley is referable to *C. wortmani*, and it is placed on record at this time.

Antrozous pallidus (Le Conte).

Two female specimens of the large pale bat were collected at Ashbaugh's Ranch, McElmo Canyon, Montezuma County, June 21, 1907. From my position at the base of the rocky walls of the canyon immediately north of the ranch, numbers of these bats were seen in the gloaming, flying about the upper rim rock in company with several smaller bats. The specimens were shot with difficulty, as the majority of individuals flew so high as to be out of range. The only previously recorded instance of the capture of this bat within the State is that given by Cones and Yarrow* of a Pueblo specimen taken many years ago and deposited in the U. S. National Museum. Unfortunately, this specimen has been lost.

* Expl. W. of 100th Mer., V, p. 85, 1875.

Callospermophilus wortmani Allen.

A pale example of *Callospermophilus* taken on the Snake River bluffs just south of the Colorado-Wyoming line, 20 miles southwest of Baggs Crossing, Wyoming, August 26, 1906, proves referable to *wortmani*, which was described from specimens taken at Kinney Ranch, Sweetwater County, Wyoming, only 40 miles north of the Snake River Valley. The above specimen, the only *Callospermophilus* seen in the valley of Snake River, was captured in a trap set for *Neotoma* among scattering cedars on a steep, rocky bluff on the north side of Snake River. Another individual seen a few days later among the bluffs on the north side of Bear River, a few miles below Maybell, appeared to be fully as pale as the Snake River specimen, and was doubtless *wortmani*. The range of this species in Colorado is probably restricted to the arid and rough badlands region bordering the lower Snake and Bear rivers, since specimens of *Callospermophilus* from mountainous localities to the east, south and west are *lateralis*.

Vol. XX, pp. 87-88 December 11, 1907

PROCEEDINGS

OF THE

BIOLOGICAL SOCIETY OF WASHINGTON

DESCRIPTIONS OF TWO NEW SUBSPECIES OF NORTH AMERICAN MAMMALS.

BY E. W. NELSON.

I am indebted to the courtesy of Mr. Outram Bangs, Curator of Mammals, Museum of Comparative Zoology, for the opportunity to describe the snowshoe rabbit named below. The squirrel is a further illustration of the extraordinary variation in Mexico in the genus *Sciurus*.

Lepus bairdi cascadensis subsp. nov.

CASCADE MOUNTAIN SNOWSHOE RABBIT.

Type from Roab's Ranch, near Hope, British Columbia, Canada, No. 1886, adult ♂, Museum of Comparative Zoology; collected by W. C. Colt, June 12, 1894.

Geographic distribution.—Cascade Mountains of southern British Columbia from the vicinity of Hope on Fraser River, south along the east side of the mountains at least to central Washington.

Subspecific characters.—Color of upperparts most like *bairdi*, but darker and more of a dusky reddish-cinnamon brown with the largest and most strongly marked blackish rump patch of any of the snowshoe rabbits; head dark reddish cinnamon, contrasting with the darker or more dusky body; ears long as in *bairdi;* skull much like that of *L. a. columbiensis.*

Remarks.—This form becomes white in winter.

Sciurus socialis littoralis subsp. nov.

PORT ANGEL SQUIRREL.

Type from Puerto Angel, Oaxaca, Mexico, No. 71,322, adult ♀, U. S. National Museum (Biological Survey Collection); collected by E. W. Nelson and E. A. Goldman, March 11, 1895.

Geographic distribution.—Coastal hills of southern Oaxaca near Puerto Angel.

General characters.—Generally similar to *S. socialis* but upperparts of body including tail distinctly more whitish while the nape patch averages darker rufous; tail with a broad band of dark, rich rufous along entire length next the skin and showing conspicuously along middle of under side;

on upper side of tail the rufous heavily overlaid by a zone of black and latter covered by a strong outer wash of whitish; tail averaging broader and more bushy than in *socialis;* underparts of body and under side of legs deep, rich rufous; base of ears behind with a bright patch of white; a forward extension of nape patch surrounds the eyes; top of head in front of nape patch darker and more iron gray than back; cheeks and under side of head whitish.

Skull.—Similar to that of *socialis.*

Measurements of type.—Total length, 526; tail vertebræ, 273; hind foot, 69.

Remarks.—The present form is based on a series of seven specimens, all from the type locality. So many squirrels have been described from Mexico that it may appear superfluous to name another. However, the present series agree so uniformly in their much paler colors when compared with the large series of typical *socialis* in the Survey collection that they evidently represent a well-marked local form. The absence of a rump patch at once distinguishes them from *cocos* which reaches a point on the coast of Oaxaca not far to the northward. To the south *socialis* occupies the coast country about Salina Cruz, Oaxaca, while a specimen collected in the mountains half a day's journey on horseback directly inland from Puerto Angel is evidently referable to *socialis.* This leaves *littoralis* with a restricted distribution. It is an intergrading form between *cocos* and *socialis* and nearly as pale as the former, but has lost the rufous rump patch characterizing that subspecies.

Vol. XX, pp. 89-120 December 31, 1907

PROCEEDINGS
OF THE
BIOLOGICAL SOCIETY OF WASHINGTON

A CHECK LIST OF THE FRESHWATER FISHES OF CANADA.

BY BARTON WARREN EVERMANN AND
EDMUND LEE GOLDSBOROUGH.

U. S. Bureau of Fisheries.

While studying two small collections of freshwater fishes obtained in Canada in 1900 and 1903 by Mr. E. A. Preble, of the U. S. Biological Survey, one made by Mr. A. J. Woolman in the Lake of the Woods in 1894, and another by the senior author in the Kootenay Lake region in 1898 (all now deposited in the U. S. National Museum), much of the literature pertaining to the freshwater fishes of Canada and their distribution was gone over. In order that the results of this labor may be preserved and a like labor saved others interested in the freshwater fishes of Canada it seemed desirable to pursue the work further and make as complete a check-list and bibliography of the freshwater fishes of Canada as the literature obtainable would permit. It is not claimed that either the bibliography or the list is entirely complete, but all the available literature has been consulted and it is believed the list given contains practically all the published references to the freshwater fishes of Canadian waters. Many of the works consulted are of a popular nature and the locality references are frequently indefinite, river basins or streams instead of definite places being given. Such general references, as a rule, have been omitted.

The anadromous fishes, such as the salmons, have been listed only when they were reported from freshwater localities. The

collection made by Mr. Woolman in 1894 is referred to in the list as (Woolman, coll., 1894) that by Dr. Evermann as (Evermann, coll., 1898) and those by Mr. Preble as (Preble, coll., 1900) and (Preble, coll., 1903–4). Mr. Preble collected in 1900 along the shores and in the barren lands to the west and northwest of Hudson Bay. In this region he obtained 9 species, 8 of which are freshwater species. In 1903–4 he collected in the Mackenzie River basin as far north as Fort McPherson, about 100 miles from its mouth. In this region he got 8 species, all of which are freshwater species.

In the following list we give, under each species, all the Canadian localities from which it has been recorded, together with references to the publications in which such records were made. These references can be fully understood by an examination of the Bibliography (pp. 114–119).

From this list it is seen that the freshwater fish-fauna of Canada as now understood consists of 145 species representing 25 families and 67 genera.

The most important families, or those represented by the greatest number of species, are the Cyprinidæ with 33 species, the Salmonidæ with 28, Catostomidæ 13, Cottidæ 12 and Percidæ 12.

The species of greatest commercial importance are, of course, the salmon, whitefish and lake trout; the ones of greatest interest to the angler are the common speckled trout, the ouananiche and the Atlantic salmon.

Vernacular names are given in most cases; those in quotation marks are those commonly in use in Canada.

The territory covered by this paper is all of Canada or British North America, that is, all of North America north of the United States except Alaska.

Annotated List of Species.

Family PETROMYZONIDÆ.

1. **Ichthyomyzon concolor** (Kirkland). Silver Lamprey.

St. Lawrence River below Quebec (Fortin 1863, as *Petromyzon*), and Hill River (Preble, coll., 1900).

2. **Ichthyomyzon castaneus** Girard. Northern Lamprey.

Assiniboine River in slough at Portage la Prairie (Thompson 1898).

3. **Lampetra cibaria** (Girard).

British Columbia (Günther 1870, as *Petromyzon ayresii*, type).

4. **Lampetra aurea** (Bean).

Great Slave Lake (Richardson 1836, as *Petromyzon fluvialis*), adhering to an Inconnu. Girard (1858) made this specimen the type of a new species which he called *P. borealis*. The proper identification of the specimen is uncertain; it is probably the same as *L. aurea*.

FAMILY ACIPENSERIDÆ.

5. **Acipenser transmontanus** Richardson. White Sturgeon.

Reported by Richardson (1836) from Pine Island Lake and Saskatchewan and Columbia rivers; Fraser River (Jordan & Gilbert 1881).

6. **Acipenser sturio** Linnæus. Common Sturgeon.

Rivers St. John and Oromocto and Grand Lake, N. B. (Perley 1852, as *Acipenser oxyrinchus*); St. Lawrence River and tributaries (Fortin 1863 and 1864, as *Acipenser oxyrhinchus*); Red River of the North at Winnipeg and in the lakes to the north (Eigenmann 1894).

7. **Acipenser rubicundus** Le Sueur. Great Lakes Sturgeon.

Lakes Ontario, Erie and Huron (Richardson 1836); Albany River District (Richardson 1836, as *Acipenser rupertianus*, type); Moose Factory, Hudson Bay (Walton Hayden, Coll., Bean 1881, as *Acipenser maculosus*); in great numbers in Saskatchewan, Red, Assiniboine and Winnipeg rivers, "the most important food-fish in the Lake of the Woods" (Thompson 1898); St. Lawrence River below Ogdensburg (Evermann and Kendall 1902).

8. **Acipenser brevirostris** Le Sueur. Short-nosed Sturgeon.

River St. Lawrence and streams flowing into it (Fortin 1864, as "Short-nosed Sturgeon (Le Sueur)").

FAMILY LEPISOSTEIDÆ.

9. **Lepisosteus osseus** (Linnæus). Long-nosed Gar.

Lake Huron at Penetanguishene (Richardson 1836, as *Lepisosteus huronensis*, type); Lake St. Peter near Sorel and River St. Lawrence below Quebec (Fortin 1864, as *Lepisosteus longirostris*); and Bay of Quinte (Halkett 1903).

FAMILY AMIIDÆ.

10. **Amia calva** Linnæus. Bowfin.

Lake Huron (Richardson 1836, as *Amia ocellicauda*, type); near Sorel in St. Lawrence River (Fortin 1865, as *Amia ocellicauda*); Lake St. Peter (Montpetit 1897, as Le Poisson-castor); Bay of Quinte (Halkett 1903); at the head of Lake Deux-Montagnes (Desrochers 1904, as *Amia ocellicaudata*).

FAMILY SILURIDÆ.

11. **Ictalurus punctatus** (Rafinesque). Spotted Catfish.

St. Catherines, Ontario (Gill 1858, as *Synechoglanis beadlei*, type); Red River of the North at Winnipeg (Eigenmann 1894); abundant in the Red River at Winnipeg (Thompson 1898).

12. **Ameiurus lacustris** (Walbaum). Great Lakes Catfish; "Mathemeg."

Hudson Bay (Pennant 1788, as *Mathemeg*); Hudson Bay (Walbaum 1792, as *Gadus lacustris*, type); Lakes Erie and Ontario (Richardson 1836, as *Silurus* (*Pimelodus*) *nigrescens*); Pine Island Lake and Saskatchewan River (Richardson 1836, as *Silurus* (*Pimelodus*) *borealis*, type); "In all ponds and streams where the yellow and white perch is taken, *fide* Perley" (Cox 1895a); Basin of River St. Lawrence, sources of the St. Leon, and the Ottawa River (Montpetit 1897, as *Ictalurus nigrescens*); Saskatchewan River, Lake Winnipeg and the small lakes connected with it (Thompson 1898); St. Lawrence River below Ogdensburg (Evermann and Kendall 1902).

13. **Ameiurus natalis** (Le Sueur). Yellow Cat.

Lake Huron at Penetanguishene (Richardson 1836, as *Silurus* (*Pimelodus*) *cœnosus*, type); Lakes Sugarbush, Bevin and Bark (D'Urban 1859, as *Pimelodus cœnosus*).

14. **Ameiurus vulgaris** (Thompson). Catfish.

Red River at Winnipeg (Thompson 1898).

15. **Ameiurus nebulosus** (Le Sueur). Common Bullhead.

Lakes that flow into the Saskatchewan and lakes and rivers to the southward (Richardson 1823, as *Silurus felis*); River St. Lawrence (Fortin 1865, as *Pimelodus nebulosus*); Gull and Muskoka lakes (Meek 1899); Glasier Lake, New Brunswick (Kendall, coll., 1901).

FAMILY CATOSTOMIDÆ.

16. **Ictiobus cyprinella** (Cuvier & Valenciennes). Common Buffalo-fish.

Red River of the North at Winnipeg (Eigenmann 1894); Winnipeg (Thompson 1898).

17. **Carpiodes thompsoni** Agassiz. Lake Carp Sucker.

Lake of the Woods at Stevens Point (Woolman, coll., 1894).

18. **Carpiodes velifer** (Rafinesque). Quillback.

Red River of the North at Winnipeg, Assiniboine River at Brandon, and Saskatchewan River at Medicine Hat (Eigenmann 1894); Winnipeg and Brandon (Thompson 1898).

19. **Catostomus griseus** (Girard). Gray Sucker.

Reported by Eigenmann (1894) from Swift Current River at Swift Current and Saskatchewan River at Medicine Hat.

20. **Catostomus catostomus** (Forster). Northern Sucker.

Hudson Bay (Forster 1773, as *Cyprinus catostomus*, type); Hudson Bay (Pennant 1788, as *Cyprinus catostomus*); Saskatchewan River at Cumberland House (Richardson 1836, as *Cyprinus* (*Catostomus*) *hudsonius*); Lake Huron and Great Slave Lake (Richardson 1836, as *Cyprinus* (*Catostomus*) *forsterianus*, type); Pic River and along the northern shores of Lake Superior (Agassiz 1850, as *Catostomus aurora*, type); St. Lawrence and its tributaries (Fortin 1865, as *Cyprinus catostomus* and *Catostomus forsterianus*); Fort Halket and Albany River (Sir J. Richardson, coll., Günther 1868, as *Catostomus hudsonius*); Skiff Lake, New Brunswick (Adams 1873, as *Catostomus longirostris*); River St. Lawrence and all its tributaries (Fortin 1863, as *Catostomus communis*); Red River of the North at Winnipeg, Swift Current River at Swift Current, Saskatchewan River at Medicine Hat, Bow and Elbow River at Calgary, Bow and Vermillion rivers at Banff, Columbia River at Golden and Revelstoke, and Kicking Horse River at Golden (Eigenmann 1894); Upper St. John River and Madawaska and Tuladi lakes (Cox 1895, as *Catostomus longirostris*); "Common in rivers and lakes throughout the interior (Labrador) and the principal food of the Indians in many parts of Labrador" (Low 1896, as *Catostomus longirostris* and *Catostomus forsterianus*); Hamilton River above the Great Falls (Chambers 1896, as red sucking carp); Winnipeg and mouth of the Souris River (Thompson 1898); Kootenay Lake, at Nelson, B. C. (Evermann, coll., 1898); Hayes River 15 miles above York Factory (Preble, coll., 1900); Glasier Lake, New Brunswick (Kendall 1903); stream near Great Bear Lake and stream near Fort Good Hope (Preble, coll., 1903–4); Watson River at Caribou Crossing, B. C., (Evermann and Goldsborough 1907).

21. **Catostomus nigricans** Le Sueur. Black Sucker; Hog Sucker.

Lake of the Woods at Rat Portage, off Coney Island, and Stevens Point and Oak Island (Woolman, coll., 1894).

22. **Catostomus macrocheilus** Girard. Columbia River Sucker.

Shushwap Lake at Sicamous and Thompson River at Kamloops (Eigenmann 1894); Kootenay Lake, Nelson, B. C. (Evermann, coll., 1898).

23. **Catostomus commersonii** (Lacépède). Common White Sucker.

Hudson Bay (Pennant 1788, as *Namapeth*); Albany River and Montreal and in Lake Madawaska (Günther 1868, as *Catostomus teres*); Red River of the North at Winnipeg, White Mud River at Westbourne, Qu'Appelle River at Qu'Appelle, Lacawana Creek at Regina, Moose Jaw River at Moose Jaw, Swift Current River at Swift Current, Maple Creek at Maple Creek, Saskatchewan River at Medicine Hat, and Bow and Elbow River at Calgary (Eigenmann 1894); Cape St. Ignace to Quebec (Montpetit 1897, as *Catostomus Bostoniensis*); Winnipeg, Westbourne, Qu'Appelle and mouth of Souris River (Thompson 1898); Grand Cascapedia, Little Cascapedia and Bonaventure rivers, P. Q., and in the Restigouche and Metapedia rivers, N. B. (Cox 1899); Gull Lake (Meek 1899);

Glasier Lake, New Brunswick (Kendall, coll., 1901); and Don River near Toronto (Nash 1906).

24. **Erimyzon sucetta oblongus** (Mitchill). Chub Sucker.

River St. Lawrence and its tributaries (Fortin 1865, as *Catostomus tuberculatus*); and small tributaries of lower St. John River (Cox 1895).

25. **Moxostoma anisurum** (Rafinesque). Redhorse.

Montreal (Günther 1868, as *Catostomus carpio*); Red River of the North at Winnipeg, and Assiniboine River at Brandon (Eigenmann 1894); Lake of the Woods at mouth of Rainy River (Woolman, coll., 1894); and Lake Winnipeg, Winnipeg and Brandon (Thompson 1898).

26. **Moxostoma aureolum** (Le Sueur). Redhorse.

Red River of the North at Winnipeg, White Mud River at Westbourne, and Assiniboine River at Brandon (Eigenmann 1894); Lake of the Woods at Oak Island (Woolman, coll., 1894); River St. Lawrence (Montpetit 1897); and Winnipeg, Westbourne and Brandon (Thompson 1898).

27. **Moxostoma macrolepidotum** (Le Sueur). Large-scaled Redhorse.

Pine Island Lake and Albany River (Günther 1868, as *Catostomus macrolepidotus*).

28. **Moxostoma lesueuri** (Richardson). Northern Redhorse.

Saskatchewan River at Carlton House and northward of Great Slave Lake (Richardson 1823, as *Catostomus lesueuri*, type); Pine Island Lake and Saskatchewan River at Cumberland House (Richardson 1836, as *Cyprinus (Catostomus) sueuri*); and Albany River District, Hudson Bay (Richardson 1836, as *Catostomus sueurii*).

FAMILY CYPRINIDÆ.

29. **Chrosomus erythrogaster** (Rafinesque). Red-bellied Dace.

Clear Lake, Lepreaux, St. Johns County, N. B. (Cox 1895); and pond near Golden Grove, 9 miles from St. John, N. B., a few small lakes in the valleys of the Grand and Little Cascapedia and from the Nouvelle lakes near New Carlisle, P. Q. (Cox 1899).

30. **Hybognathus nuchale** Agassiz. Silvery Minnow.

Red River of the North (Thompson 1898).

31. **Pimephales promelas** (Rafinesque). Bull Minnow.

Red River of the North at Winnipeg; Assiniboine River at Brandon, Qu'Appelle River at Qu'Appelle, White Mud River at Westbourne, Lacawana Creek at Regina, Swift Current River at Swift Current, Maple Creek at Maple Creek, and Saskatchewan River at Medicine Hat (Eigenmann 1894); Winnipeg, Westbourne, Brandon and Qu'Appelle (Thompson 1898).

32. **Pimephales notatus** (Rafinesque). Blunt-nosed Minnow.

Montreal (Baird, coll., 1853).

33. **Mylocheilus caurinus** (Richardson). Columbia River Chub.

Fraser River at Mission, Thompson River at Kamloops, Shushwap

Lake at Sicamous, Columbia River at Revelstoke and Golden, and Kicking Horse River at Golden (Eigenmann 1894).

34. **Semotilus bullaris** (Rafinesque). Fall Fish; "Ouitouche"; "Chub."

River St. John, the Miramichi at Boiestown, in the Hammond River and in every river and stream in New Brunswick and Nova Scotia (Perley 1852, as *Leuciscus cephalus*); small streams in Quebec (Baird, coll., 1853); "The most abundant fish in all the lakes and rivers throughout the district" [Valley of the Rouge River] (D'Urban 1859, as *Leuciscus pulchellus*); River St. Lawrence, Montreal and Quebec (Fortin 1865, as *Leuciscus canadensis*, type); small stream near Baring, New Brunswick (Kendall 1894); and "every river and stream" in New Brunswick (Cox 1895a, as *Semotilis corporalis*); feeders of the Kiskisink lakes, Peribonca River between Lakes St. John and Tschotagama (Chambers 1896); "in swift water eddies and pools in New Brunswick (Cox 1895a); Glasier Lake, New Brunswick (Kendall, coll., 1901).

35. **Semotilus atromaculatus** (Mitchill). Creek Chub.

River St. Lawrence and nearly all the rivers and streams running into it (Fortin 1865, as *Leuciscus atromaculatus*); Gull Lake (Meek 1899); Grand and Little Cascapedia and New Carlisle lakes, P. Q., and "common in all the waters of New Brunswick" (Cox 1899); and Don River near Toronto (Nash 1906).

36. **Ptychocheilus oregonensis** (Richardson). Squawfish.

Fraser River (Günther 1868, as *Leuciscus oregonensis*); and Thompson River at Kamloops and Shushwap Lake at Sicamous (Eigenmann 1894).

37. **Leuciscus balteatus** (Richardson). Columbia River Minnow.

Thompson River at Kamloops, Fraser River at Mission, Shushwap Lake at Sicamous, Griffin Lake at Griffin, Columbia River at Revelstoke, and Kicking Horse and Columbia rivers at Golden (Eigenmann 1894, as *Leuciscus balteatus lateralis*).

38. **Leuciscus elongatus** (Kirkland).

Don River near Toronto (Nash 1906).

39. **Leuciscus neogæus** (Cope).

Pond in Maugerville (Sunbury County, N. B.), Dark Lake (near St. John, N. B.), Garnetts Lake (near Loch Lomond), and pond near Anagance, Kings County, N. B. (Cox 1895, as *Phoxinus neogæus*); several small lakes near the mouth of the St. John (Dark Lake, Water-works Lake and McDonald Lake) and also in a small lake near New Carlisle, P. Q. (Cox 1899, as *Phoxinus neogæus*).

40. **Abramis crysoleucas** (Mitchill). Roach.

Lake Huron at Penetanguishene (Richardson 1836, as *Cyprinus* (*Leuciscus*) *chrysoleucas*); waters near Hampton Ferry, N. B. (Perley 1852, as *Leuciscus chrysoleucas*); small stream near Baring, New Brunswick (Kendall 1894, as *Notemigonus chrysoleucus*); reported by Cox (1895, as

Notemigonus chrysoleucas) from near Hampton Ferry; French Lake, Sunbury, and adjacent ponds and streams; Belleisle and Peabody Lake, Northumberland, N. B., and Gull Lake (Meek 1899); valley of the Grand Pabos, P. Q., in Lac à Canard and Murphy Lake and in Metapedia river and lake, P. Q., also from Afton Lake, near Mount Stewart, Prince Edward Island (Cox 1899, as *Notemigonus chrysoleucas*).

41. **Notropis jordani** Eigenmann & Eigenmann.

Saskatchewan River at Medicine Hat (Eigenmann and Eigenmann 1893, as *Notropis albeolus*, type, and as *Notropis jordani*, type).

42. **Notropis cayuga** Meek.

Qu'Appelle River at Qu'Appelle (Eigenmann and Eigenmann 1893, as *Notropis heterolepis*, type), and Qu'Appelle (Thompson 1898).

43. **Notropis blennius** (Girard). Straw-colored Minnow.

Assiniboine River at Brandon, and Qu'Appelle River at Qu'Appelle (Eigenmann and Eigenmann 1893, as *Notropus reticulatus*, type); Red River of the North at Winnipeg (Eigenmann 1894, as *Notropis deliciosus*); Lake of the Woods at Garden Island and at Oak Island (Woolman, coll., 1894), and Winnipeg, Brandon and Fort Qu'Appelle (Thompson 1898).

44. **Notropis hudsonius selene** (Jordan). Shiner.

Lake of the Woods at mouth of Rainy River and at Asmus Point (Woolman, coll., 1894); Winnipeg, Brandon, Fort Qu'Appelle and Medicine Hat (Thompson 1898); and Hayes River 15 miles above York Factory (Preble, coll., 1900).

45. **Notropis cornutus** (Mitchill). Redfin.

Small lake, Rouge River drainage, Montcalm District, Quebec (D'Urban 1859, as *Leuciscus frontalis*); River St. Lawrence and "nearly all the rivers and streams running into it" (Fortin 1865, as *Leuciscus rittalus*); Montreal (Günther 1868, as *Leuciscus cornutus*); Assiniboine River at Brandon (Eigenmann 1894, as *Notropis megalops*); "All swift and limpid streams in New Brunswick (Cox 1895a); Brandon (Thompson 1898); Gull and Muskoka lakes (Meek 1899); in Province of Quebec in brooks emptying into the Grand Cascapedia near its mouth (Cox 1899, as *Leuciscus cornutus*); Glasier Lake, New Brunswick (Kendall, coll., 1901); St. Lawrence River near Ogdensburg (Evermann and Kendall 1897); and Don River near Toronto (Nash 1906).

46. **Notropis cornutus frontalis** (Agassiz).

Montreal River on the eastern shore of Lake Superior (Agassiz 1850, as *Leuciscus frontalis*, type).

47. **Notropis muskoka** Meek.

Gull Lake (Meek 1899, type).

48. **Notropis jejunus** (Forbes).

Red River of the North at Winnipeg, Assiniboine River at Brandon and Saskatchewan River at Medicine Hat (Eigenmann 1894); Lake of

the Woods at Garden Island, at Oak Island, at mouth of Rainy River and at Asmus Point (Woolman, coll., 1894); and Winnipeg at Brandon (Thompson 1898).

49. **Notropis scopifer** Eigenmann & Eigenmann.

Red River of the North at Winnipeg, Assiniboine River at Brandon, Qu'Appelle River at Qu'Appelle, and Saskatchewan River at Medicine Hat (Eigenmann and Eigenmann 1893, type).

50. **Notropis atherinoides** (Rafinesque).

Pic River, northern shore of Lake Superior (Agassiz 1850, as *Alburnus rubellus*, type); Red River of the North at Winnipeg and Saskatchewan River at Medicine Hat (Eigenmann 1894); Lake of the Woods at Oak Island (Woolman, coll., 1894); and Winnipeg (Thompson 1898); St. Lawrence River near Ogdensburg (Evermann and Kendall 1902).

51. **Notropis rubrifrons** (Cope).

Lake of the Woods at Asmus Point and at mouth of Rapid River (Woolman, Coll., 1894); St. Lawrence River below Ogdensburg (Evermann and Kendall 1902).

52. **Rhinichthys cataractæ** (Cuvier & Valenciennes). Long-nosed Dace.

Montreal (Günther 1868, as *Rhinichthys marmoratus*); Lake Metapedia, P. Q., and generally throughout New Brunswick (Cox 1899).

53. **Rhinichthys cataractæ dulcis** (Girard).

Swift Current River at Swift Current, Saskatchewan River at Medicine Hat, Bow River at Calgary, Hot Sulphur Springs at Banff, and Elbow River at Calgary (Eigenmann 1894).

54. **Rhinichthys atronasus** (Mitchill). Black-nosed Dace.

St Lawrence River near Ogdensburg (Evermann and Kendall 1902); "In almost every brook in New Brunswick" (Cox 1895a); Cascapedia and Bonaventure rivers, P. Q. (Cox 1899); and Don River near Toronto (Nash 1906).

55. **Agosia falcata** Eigenmann & Eigenmann.

Shushwap Lake, Sicamous, B. C. (Eigenmann and Eigenmann 1893, as *Agosia shuswap*, type).

56. **Hybopsis storerianus** (Kirtland).

Red River of the North at Winnipeg (Eigenmann 1894); and Winnipeg (Thompson 1898).

57. **Couesius dissimilis** (Girard).

Swift Current River at Swift Current, Sackatchewan River at Medicine Hat, and Bow and Elbow rivers at Calgary (Eigenmann 1894).

58. **Couesius plumbeus** (Agassiz).

Upper St. John and Madawaska rivers and Squattook and Temiscouata lakes, Spruce Lake, St. John County, N. B., and Water-works Lake, some

miles from St. John, N. B., Loch Lomond, St. John County, N. B. (Cox 1895, as *Couesius prosthemius*); Metapedia river and lake, Grand and Little Cascapedia, Nouvelle (New Carlisle) lakes and in the basin of the Grand Pabos (Lac à Canard and Murphy Lake, P. Q. (Cox 1899, as *Ceratichthys plumbeus*); Glasier Lake, New Brunswick (Kendall, coll., 1901); Grant or St. Croix Lake (Preble, coll., 1903–4).

59. **Couesius greeni Jordan.**

Stuart Lake, B. C. (Jordan 1894, type); Fort St. James, B. C. (Cox 1895); Kootenay Lake, at Nelson, B. C. (Evermann, coll. 1898).

60. **Platygobio gracilis** (Richardson). Flat-headed Minnow.

Saskatchewan River at Carlton House (Richardson 1836, as *Cyprinus (Leuciscus) gracilis*, type); Assiniboine River at Brandon and Saskatchewan River at Medicine Hat (Eigenmann 1894); Brandon (Thompson 1898); and Athabasca River at Grand Rapids and Mackenzie River at Forts Simpson and Good Hope (Preble, coll., 1903-4).

61. **Exoglossum maxillingua** (Le Sueur). Cut-lip Minnow.

St. Lawrence River near Ogdensburg (Evermann and Kendall 1902).

Family ANGUILLIDÆ.

62. **Anguilla chrysypa** Rafinesque. Common Eel.

Streams and lakes of Greenland (Fabricius 1780, as *Muræna anguilla*); River St. Lawrence and several of its tributaries (Fortin 1862, as *Muræna anguilla*); "taken in every situation it can reach, does not occur above the Grand Falls, St. John River; albinos are sometimes met with" (Cox 1895a, as *Anguilla rostrata*); Basin of River St. Lawrence, Quebec; Montreal (Montpetit 1897, as *Anguilla vulgaris* and *Anguilla muræna*); stream in island of Anticosti (Schmitt 1904).

Family HIODONTIDÆ.

63. **Hiodon alosoides** (Rafinesque). "La Quesche"; Naccaysh."

Saskatchewan River at Cumberland House (Richardson 1836, as *Hiodon chrysopsis*, type); Saskatchewan valley (Wright 1892); Red River of the North at Winnipeg and Assiniboine River at Brandon (Eigenmann 1894); "Abundant in all the rivers of the plains, Swan Lake; Assiniboine River at Portage la Prairie and upper Assiniboine River, Brandon, and Red River of the North at Winnipeg" (Thompson 1898).

64. **Hiodon tergisus** Le Sueur. Moon-eye.

Saskatchewan River at Cumberland House (Richardson 1823, as *Hiodon clodalis*); Richelieu River (Richardson 1836, as *Cyprinus (Abramis?) smithii*, type); River St. Lawrence (Fortin 1864); Red River of the North at Winnipeg and Assiniboine River at Brandon (Eigenmann 1894); Lake of the Woods at mouth of Rainy River at Stevens Point (Woolman, coll.,

1894); River St. Lawrence; Lake St. Peter and in the Ottawa (Montpetit 1897); Winnipeg and Brandon (Thompson 1898).

Family CLUPEIDÆ.

65. **Alosa sapidissima** (Wilson). Common Shad.

"Miramichi River shad and those ascending the St. John, resort for spawning to Darlings Lake (Kennebecasis), Douglas Lake (Nerepis), the Washademore, Oenabag and Grand Lakes and Oromocto River" (Perley 1852); River St. Lawrence (Fortin 1862, as *Clupea alosa*); St. Lawrence River (Goode 1884, as *Clupea sapidissima*); and River St. Lawrence to Montreal (Montpetit 1897, as *Clupea sapidissima*); Bay of Fundy and Miramichi Bay and occasionally in Bai des Chaleurs (Cox 1895a).

66. **Clupea harengus** Linnæus. Common Herring.

South shore of River St. Lawrence (Fortin 1862, as *Clupea sardina*).

67. **Pomolobus pseudoharengus** (Wilson). Alewife; "Gaspereau."

St. Lawrence River below Ogdensburg (Evermann and Kendall 1902).

Family SALMONIDÆ.

68. **Coregonus coulteri** Eigenmann & Eigenmann. Coulter's Whitefish.

Kicking Horse River at Field (type locality) and Golden (Eigenmann and Eigenmann, 1892, type).

69. **Coregonus williamsoni** Girard. Williamson's Whitefish.

Columbia River at Golden and Revelstoke, Bow River at Calgary and Banff, and Shushwap Lake at Sicamous (Eigenmann 1894); and Kootenay Lake at Nelson, B. C. (Evermann, coll., 1898).

70. **Coregonus kennicotti** Milner. Kennicott's Whitefish.

Hudson Bay (Pennant 1788, as *salmo lavaretus*); Fort Good Hope (Milner 1883, type), and Delta of the Mackenzie (Gilbert 1894); Barter Island near mouth of Mackenzie River (Scofield 1899); Lake Bennett (Evermann and Goldsborough 1907).

71. **Coregonus richardsoni** Günther. Richardson's Whitefish.

Arctic North America (Günther 1866, type); Mackenzie River basin (Preble, coll., 1903–4).

72. **Coregonus quadrilateralis** Richardson. Round Whitefish.

Fort Enterprise (type locality) and in the Arctic Sea, also Hudson Bay and about Fort Churchill (Richardson 1823); Bathurst Inlet and Great Bear Lake (Richardson 1836, as *Salmo* (*Coregonus*) *quadrilateralis*); St. John above the Grand Falls and in many of the lakes drained by its tributaries (Cox 1895); Madawaska and Upper St. John rivers, N. B. (Cox 1895a); Glasier Lake, New Brunswick (Kendall, coll., 1901); Lake Bennett, Lake Atlin, and Caribou Crossing (Evermann and Goldsborough 1907).

73. **Coregonus clupeiformis** (Mitchill). Common Whitefish; "Poisson blanche."

Coppermine River and Bathurst Inlet (Richardson 1823, as *Coregonus albus*); Pine Island Lake and Lake Huron (Richardson 1836, as *Salmo* (*Coregonus*) *albus*); along the northern shores of Lake Superior (Agassiz 1850, as *Coregonus latior*, type); Albany River (Sir John Richardson, coll., Günther 1866, as *Coregonus albus*); Lake Mistassini (Low 1896); Hamilton River above the Great Falls and Grande Décharge, Lake St. John (Chambers 1896); and Lakes Manitoba and Winnipegosis (Thompson 1898).

74. **Coregonus nelsoni** Bean. Nelson's Whitefish.

Lake Bennett, British Columbia (Evermann and Goldsborough 1907).

75. **Coregonus labradoricus** Richardson. Labrador Whitefish; "Musquaw River Whitefish."

Musqnaw River (Richardson 1836, as *Salmo* (*Coregonus*) *labradoricus*, type); ? Saskatchewan River (Richardson, coll., Cuvier & Valenciennes, 1848, as *Coregonus angusticeps*); Lake Temiscouata and Madawaska River, N. B., also Eagle Lakes at the head of Fish River and in St. Francis Lakes, Tuladi River and Grand Lake, N. B. (Perley 1852, as *Coregonus albus*); River St. Lawrence and some rivers flowing into it (Fortin 1863, as *Coregonus albus*); Madawaska, Lower St. John, Upper Restigouche rivers and Eagle, St. Francis and Grand Lakes, N. B. (Cox 1895a); Lake of the Woods (Thompson 1898); Restigouche and Metapedia rivers, P. Q. (Cox 1899); Glasier Lake, St. Francis River, New Brunswick (Kendall 1903).

76. **Argyrosomus artedi** (Le Sueur). Common Lake Herring.

Lake Erie and Lewistown, Upper Canada (Le Sueur 1818, as *Coregonus artedi*, type); Lake Huron at Penetanguishene (Richardson 1836, as *Salmo* (*Coregonus*) *harangus*, type); Pic River and along the northern shores of Lake Superior (Agassiz 1850); Moose Factory (Bean 1881, as *Coregonus artedi*); and Thirty-one Mile Lake, Quebec, sixty miles north of Ottawa (Gen. D. D. Wylie, coll., Shields 1897).

77. **Argyrosomus pusillus** (Bean). Least Whitefish.

Barter Island near the mouth of the Mackenzie River (Scofield 1899).

78. **Argyrosomus lucidus** (Richardson). Great Bear Lake Herring.

Great Bear Lake (Richardson 1836, as *Salmo* (*Coregonus*) *lucidus*, type); Great Bear Lake River (Gilbert 1894, as *Coregonus lucidus*); Hershel Island (Scofield 1899); and Arctic Red River (Preble, coll., 1903–4).

79. **Argyrosomus tullibee** (Richardson). Tullibee.

Saskatchewan River at Cumberland House, Pine Island Lake, and Albany District, Hudson Bay (Richardson 1836, as *Salmo* (*Coregonus*) *tullibee*, type); and Albany River (Sir John Richardson, coll., Günther 1866, as *Coregonus tullibee*).

80. **Stenodus mackenzii** (Richardson). "Inconnu."

Mackenzie River and lakes and rivers flowing into it and also in Salt River (Richardson 1823, as *Salmo mackenzii*, type); Mackenzie River and Great Slave Lake (Richardson 1836, as *Salmo mackenzii* and Inconnu); and delta of the Mackenzie River (Gilbert 1894); mouth of Mackenzie River (Schofield 1899); headwaters of the Yukon River (Evermann and Goldsborough 1907).

81. **Oncorhynchus gorbuscha** (Walbaum). Humpback Salmon.

Seton Lake Hatchery (Babcock 1905).

82. **Oncorhynchus tschawytscha** (Walbaum).

Columbia River at Golden and Revelstoke, Thompson River at Kamloops and Fraser River at Mission (Eigenmann 1894); Skeena River and its tributaries, and Shushwap and Seton lakes and their tributaries (Babcock 1902).

83. **Oncorhynchus kisutch** (Walbaum). Coho Salmon.

Seton Lake, Shuswap Lake and its tributaries, Skeena River and its tributaries (Babcock 1902).

84. **Oncorhynchus nerka** (Walbaum). Sockeye Salmon.

Chiloweyuk Lake, near Fraser River (Dr. Kennerly, coll.); and Nehoialpitkwa River (Gibbs, coll., Suckley 1861a, as *Salmo kennerlyi*, type); Fraser River (Dr. Kennerly, coll., Suckley 1861a, as *Salmo warreni*, type); Fraser and Skagit rivers (Suckley 1861a, as *Salmo richardii*, type); Chiloweyuk Lake (North latitude 49°), near Fraser River, and Nicola, Francois, Fraser, Okanogan, Stuart and Shushwap lakes (Evermann 1897); Stuart and Nicola lakes, B. C. (Evermann and Meek 1898, small form); and Kootenay Lake near Nelson, B. C. (Evermann, coll., 1898, small form); Quesnel River and headwaters of Fraser River, Horsefly River, Seton and Anderson lakes, Birkenhead River, Lillooet Lake, Shushwap Lake and tributaries, Oweekagno Lake and its tributaries, Wannuck River, Skeena River and its tributaries (Babcock 1902).

85. **Salmo salar** Linnæus. Atlantic Salmon.

Lakes and rivers of Greenland (Fabricius 1780); Hudson Bay (Pennant 1788); Quebec (Richardson 1836); Shubenacadie River; Snake Lake, Halifax County, Nova Scotia; Bedford River, near Halifax; General Bridge River (Gilpin 1866); Loch Lomond and Mispeck and Sagnenay rivers (Adams 1873, as *Salmo gloveri*); St. Johns, Grand and Pockwock lakes and Salmon River, in Nova Scotia (Hallock 1873); St. Lawrence River (Hallock 1877); Lower St. Lawrence, Rimouski, Grand Metis, Sagnenay rivers (Roosevelt 1884); St. Lawrence River (Goode 1884); Romaine, Little Esquimaux, Moisie, St. Augustine, Little Mecatina, Netaginau, Etamamiow, Coacoachoo, Olomonasheebo, Washecootai, Great and Little Musquarro, Kegashka, Goynish, Wabisipi, Great and Little Watshieshoo, Corneille, Romaine, Mingan, St. John, Magpie, Thunder, Sheldrake, Manitou, Margaret, Trinity, Laval and Little Bergeronnes rivers (Chambers 1896); "Abundant in the rivers of the St.

Lawrence and Atlantic coast flowing into Ungava Bay, and Stupart Bay, also in Koksoak River, but not in the rivers draining into Hudson Bay" (Low 1896); Loch Lomond, Sciff Lake and Musquash Lake, N. B. (Cox 1895, as Wininnish); la Riviere Jupiter, Island of Anticosti (Schmitt 1904).

86. **Salmo ouananiche** (McCarthy). "Ouananiche"; "Wananishe"; "Winnonish"; "Winninish," and many variants of the word.

Upper Saguenay River system and Lake St. John (Creighton 1892, as *Salmo salar*, variety *Sebago*); Saguenay River and Lake St. John (McCarthy 1894, as the Ouananiche); Saguenay River (McCarthy in Jordan and Evermann 1896, as *Salmo salar ouananiche*, type); Lake St. John, branches of Hamilton River, lakes of the Goynish (especially Lake Victor), Wat-shu-shoo and Piastre-baie rivers, Peribonca, Lake Manouan, Koksoak River, lakes and river stretches of the upper part of George River (which flows into Ungava Bay), Lake Michikamow at the head of Northwest River (which flows into Hamilton Inlet), head of Romaine River and Natashquan River, Ashuanipi branch of Hamilton River, Grande Décharge, Lac à Jim, Lac Tscholagama, and Lac aux Rats (Chambers 1896).

87. **Salmo clarkii** (Richardson). Cutthroat Trout.

Kootenay River (Dr. Kennerly, coll., Suckley 1861, as *Salmo lewisi*); Bow and Elbow rivers at Calgary, Bow and Vermillion rivers at Banff, Griffin and Shushwap lakes and Thompson River at Kamloops (Eigenmann 1894), as *Salmo irideus masoni*).

88. **Salmo kamloops** Jordan. Kamloops Trout.

Kamloops Lake, B. C. (Jordan, type, in Jordan and Evermann 1896–1900); Kootenay Lake (Jordan and Snyder MS. 1907).

89. **Cristivomer namaycush** (Walbaum). Great Lakes Trout; "Touladi"; "Lunge"; Gray Trout; Mackinaw Trout; "Quene fourchée."

Hudson Bay (Pennant 1788, as *Namaycush*); Hudson Bay (Walbaum 1792 as *Salmo namaycush*, type); Lake Huron and Winter Lake (Richardson 1836, as *Salmo namaycush*); Mingan River (Richardson 1836, as *Salmo hoodii*, type in part); northern shores of Lake Superior (Agassiz 1850, as *Salmo namaycush*); lakes at the sources of the St. Croix and St. John rivers and Lakes Toledi and Temiscouata (Adams 1873, as *Salmo confinis*); St. Francis Lakes; Lakes Matapediac, Miramichi, Temiscouata, Cheputnecticook and Loch Lomond (Lanman 1874, as *Salmo toma*); Conim Lake, British Columbia (Jordan 1888, as *Salvelinus namaycush*); from Bow and Elbow rivers at Calgary; Devils Lake, Bow and Vermillion rivers at Banff, Columbia River at Golden and Revelstoke (Eigenmann 1894, as *Salvelinus namaycush*); "in all the large lakes of New Brunswick except the river and lake systems between the Restigouche and St. John" (Cox 1895a, as *Salvelinus namaycush*); headwaters of the Fraser and Columbia rivers, streams of Vancouver Island and Lac des Neiges (Jordan and Evermann 1896); Lake Superior, Lake Metis, Lake St. John, Lake

Tschotagama, Lac à Jim, Lake Mistassini, Lac des Aigles, Lakes Kiskisink, Manouan, Nepigon, Pipwuakin, St. Charles, and Betsiamitz, Hamilton River above the Great Falls (Chambers 1896); "Very plentiful in all the larger lakes of the interior northward to Hudson Strait and also in the lake-expansions of the Hamilton River and Lake Michikaman" (Low 1896); Muskoka Lake (Meek 1899); Lake Atlin, Tagish Arm, Lake Bennett and Summit Lake (at White Pass) (Evermann and Goldsborough 1907).

90. **Cristivomer namaycush siscowet** (Agassiz). Siscowet.

At Michipicotin and everywhere along the northern shores of Lake Superior (Agassiz 1850, as *Salmo siscowet*, type).

91. **Salvelinus fontinalis** (Mitchill). Eastern Brook Trout; Speckled Trout.

Canada (Hamilton Smith in Griffith's Cuvier, 1834, as *Salmo Canadensis*, type); Fort Enterprise, Pine Island Lake (Richardson 1836 as *Salmo fontinalis*); Boothia Felix (Richardson 1836, as *Salmo hoodii*, type, in part); Lake Huron at Penetanguishene (Richardson 1836, as *Salmo fontinalis);* Red Bay, Labrador (Storer 1850, as *Salmo immaculatus*, type); small lakes and streams between Balsam and the one in the 11th Lot 3rd Range Montcalm, Trembling Lake, and Lake of the Three Mountains (D'Urban 1859, as *Salmo fontinalis*); Hudson Bay and vicinity (C. Drexler, coll.), Labrador (Elliot Coues, coll.) and Newfoundland (Theo. Gill, coll.), (Suckley 1861a, as *Salmo hudsonicus*, type); Digby Basin and Miramichi River (Gilpin 1866, as *Salmo fontinalis*); Cole Harbour and Musquoboboit River (Gilpin 1866, as *Salmo canadensis*); St. Ignace Island, Lake Superior (Thompson 1883); Nepigon River, Ontario (Wright 1892, and many anglers and outing magazines); nearly every lake and stream in New Brunswick (Cox 1895a); "Abundant in many of the rivers and lakes of the Labrador Peninsula, on the Atlantic coast and Ungava Bay, particularly plentiful and of large size along these coasts, the mouth of every river swarms with trout during late summer and autumn," Koksoak, George, Romaine and Northwest rivers; Hamilton Inlet and James Bay (Low 1896); Grand Falls of the Hamilton, Ouiatchouan River, Lac de la Belle Rivière, Lake Batiscan, Lac des Grandes Îles (or Lake Edward), Rivière aux Rats, River Jeannotte, Grand Lake, Jacques Cartier, Aleck, Aux Ecorces, Au Sable, Betsiamitz, Blanche, Chigobiche, de la Belle Rivière Aigles, Aulnaies, Habitants, Grande Décharge, Montmorenci, Little Peribonca, Otter, Ouiatchouaniche, and Shipshaw rivers; Lac a l'Ours; Lakes Beauport, Epipham, Mistassini, Pipmaukin, St. Charles and Round Lake; Noel Traverse, Lac à Regis, Lac à l'Epaule, Lac des Roches, Lac Sept Isles, Metabetchouan and La Belle Rivière (flowing into Lake St. John), the Pikauba (flowing into Lake Kenogami), the Chicoutimi, À Mars and Ha Ha rivers (tributary to the Saguenay), the Malbaie (la grande rivière of St. Ann de Beaupré), the Montmorenci, the Jacques Cartier, the St. Anne (de la Perade), Nepigon River, Teschotagama

Manouan and Lac à Jim (Chambers 1896); Gessier and Bear lakes, N.B. (Kendall, coll., 1901); La Rivière aux Canards, Anticosti Island (Schmitt 1904).

92. **Salvelinus malma** (Walbaum). Dolly Varden Trout; Western Charr.

Kootenay River (Suckley 1861a, as *Salmo Parkei*, type), and South Saskatchewan River (Jordan 1888); Herschel Island (Scofield 1899); Seton Lake, B. C. (Babcock 1902, as Dolly Varden Trout).

93. **Salvelinus alpinus alipes** (Richardson). Greenland Charr.

Lakes and rivers of Greenland (Fabricius 1780, as *Salmo alpinus*); Lakes in Prince Regents Inlet (Richardson 1836, as *Salmo alipes*, type, and as *Salmo nitidus*, type).

94. **Salvelinus alpinus stagnalis** (Fabricius).

Mountain streams of Greenland (Fabricius 1780, as *Salmo stagnalis*); type, and as *Salmo rivalis*, type); Greenland (Pennant 1788, as *Salmo stagnalis*); Coppermine River (Richardson 1823, as *Salmo hearnii*, type), Regents Inlet and rivers of Boothia Felix (Richardson 1836, as *Salmo rossii*, type), and Bloody Fall, Coppermine River (Richardson 1836, as *Salmo hearnii*).

95. **Salvelinus marstoni** (Garman). Marston Trout; Red Canadian Trout.

Lac de Marbre, Quebec County, Quebec (Garman 1893, as *Salmo marstoni*, type); one of the lakes of the Laurentides Club in the Lake St. John district, Lac des Îles, some of the Rimouski series of lakes (Lac à Cassette), lake between Quebec and Lake St. John, Templeton in the Ottawa district (Chambers 1896); Lake Saccacomi and Red lakes (township of St. Alexis des Monts, Maskinonge County, Quebec) (John W. Titcomb, coll., 1901); Decalonnes township, Quebec (specimens received by the U. S. National Museum in 1886 from Eugene Blackford); Lake Tourille, headwaters of St. Anne River, Province of Quebec (specimen received by U. S. National Museum in 1899 from Graham H. Harris); lake in Chernier township, Rimouski County, Province of Quebec (2 specimens received in 1896 by U. S. National Museum from Department of Crown Lands) (Evermann & Kendall 1902).

FAMILY THYMALLIDÆ.

96. **Thymallus signifer** (Richardson). Arctic Grayling; Alaska Grayling.

Clear rivers to the northward of Great Slave Lake (Richardson 1823, as *Coregonus signifer*, type); Little Winter River (Richardson 1823, as *Coregonus thymalloides*, type); Winter River and Great Bear Lake (Richardson 1836, as *Salmo* (*Thymallus*) *signifer*); Winter River (Richardson 1836, as *Salmo* (*Thymallus*) *thymalloides*); Fort Simpson, British America (Milner 1872–73); Mackenzie River near Fort Simpson (Gilbert 1894); Great Bear Lake at Fort Franklin (Preble, coll., 1903–4); Tagish Arm, Kilbourne Creek and outlet of Lake Bennett near Caribou Crossing, small

lake near Log Cabin between Caribou Crossing and Lake Bennett, Lake Bennett at Lake Bennett Station, Lake Atlin and Forty-mile Creek (Evermann and Goldsborough 1907).

Family ARGENTINIDÆ.

97. **Thaleichthys pacificus** (Richardson). Eulachon.

Fraser and Nass rivers (Jordan & Gilbert 1881).

98. **Osmerus mordax** (Mitchill). Smelt.

River St. Lawrence as far as Quebec (Fortin 1862, as *Osmerus viridescens* and *Osmerus operlanus*); abounds in New Brunswick, being landlocked in many lakes (Cox 1895a); Quebec and Trois rivières (Montpetit 1897, as *Osmerus viridescens*); and mouth of Northwest River, Hamilton Inlet (Low 1896).

99. **Osmerus dentex** Steindachner.

Arctic Red River (Preble, coll., 1903–4).

Family UMBRIDÆ.

100. **Umbra limi** (Kirtland). Mud Minnow.

Canada (Fortin 1865, as *Hydrargyra atricauda*); streams and little rivers of Gull Lake (Meek 1899); "on the ice in the marsh east of Toronto" (Nash 1906).

Family ESOCIDÆ.

101. **Esox reticulatus** (Le Sueur). Common Eastern Pickerel.

River St. Lawrence (Fortin 1863); small stream near Baring, New Brunswick (Kendall 1894, as *Lucius reticulatus*); "Lower St. John and its affluents" (Cox 1895a); the Meduxnakik, a branch of the St. John River (introduced) (Cox 1899).

102. **Esox lucius** Linnæus. Pike.

Hudson Bay (Pennant 1788, as *Pike*); Lake Huron (Richardson 1836); Lake Huron at Penetanguishene (Richardson 1836, as *Esox estor*); Northern shores of Lake Superior (Agassiz 1850, as *Esox boreus*, type); basin of River St. Lawrence (Montpetit 1897, as *Esox estor* and *Esox lucius*); Lakes Sugarbush, Bevin and Bark, and Rouge River (D'Urban 1859, as *Esox boreus*); River St. Lawrence (Fortin 1863, as *Esox estor*); St. Ignace Island, Lake Superior (Thomson 1883); St. Lawrence River (Hallock 1877); Grand Chute, Lake St. John and Peribonca (Creighton 1892); Red River of the North at Winnipeg, Assiniboine River at Brandon, White Mud River at Westbourne, Moose Jaw River at Moose Jaw, Swift Current River at Swift Current, Saskatchewan River at Medicine Hat (Eigenmann 1894); Hamilton River, Lac aux Brochets, Lakes Jim, Mistassini, Pipmaukin, St. John and Tschotagama, Big and Little Nekebau lakes, Obahtegooman, Ojebogoomon and adjacent waters, Rivière

au Pipe, Rivière au Cochon, Betsiamitz, Hamilton and Peribonca rivers (Chambers 1896); St. Lawrence River between New York and Ontario (Rathbun and Wakeham 1897, as *Pike);* from Quebec to Upper Ottawa and divisions of Richelieu, Chambly, Iberville, Chateauguay, Beauharnais, Trois Rivières, Berthier, Joliette, Montreal, Terrebonne, Deux-Montagnes, Ottawa, and Gatineau (Montpetit 1897); Lake Winnipeg, Little Saskatchewan, Winnipeg, Brandon, Westbourne (Thompson 1898); and Muskoka Lake (Meek 1899).

103. **Esox masquinongy** (Mitchill). Muskallunge.

St. Lawrence River at Thousand Island (Hallock 1877, as *Esox nobilior* and *Esox estor*); St. Lawrence River (Goode 1884, as *Esox nobilior*); Lakes Simcoe, Rice and Scugog (Wright 1892, as *Esox nobilior*); Quebec to Upper Ottawa River and Divisions of Richelieu, Chateauguay, and Beauharnais, Trois Rivières, Berthier and Joliette; Lake Deux-Montagnes and Lower Ottawa, Montreal, Upper Ottawa and Gatineau (Montpetit 1897, as *Esox nobilior*).

Family PŒCILIIDÆ.

104. **Fundulus heteroclitus** (Linnæus).

Rivers, ponds and lakes of Anticosti Island (Schmitt 1904).

105. **Fundulus diaphanus** (Le Sueur). Gray-back Minnow.

French and Grand lakes, in Sunberry and Green counties and Belleisle and St. John rivers, N. B. (Cox 1895a); Hillsboro River and at Rustico, P. E. Island, also common in the Bonaventure, Grand Pabos, York and Dartmouth rivers, P. Q., and in the lower course of the St. John, N. B., and in lakes about the Bay of Fundy (Cox 1899); St. Lawrence River near Ogdensburg (Evermann and Kendall 1902).

Family GASTEROSTEIDÆ.

106. **Eucalia inconstans** Kirtland. Brook Stickleback.

Near Montreal (Dawson 1859, as *Gasterosteus gymnetes*, type); Qu'Appelle, Lacawana Creek at Regina, Swift Current River at Swift Current, Maple Creek at Maple Creek, Bow and Elbow rivers at Calgary (Eigenmann 1894); lower parts of St. John River (Cox 1895, as *Gasterosteus inconstans*); and Qu'Appelle (Thompson 1898).

107. **Pygosteus pungitius** (Linnæus). Nine-spined Stickleback.

Saskatchewan River at Cumberland House (Richardson 1823, as *Gasterosteus pungitius);* Saskatchewan River and Great Bear Lake (Richardson 1836, as *Gasterosteus concinnus*, type); Mouth of Nelson River (Robert Bell, coll., Bean 1881, as *Gasterosteus pungitius*); Qu'Appelle River at Qu'Appelle (Eigenmann 1894); Qu'Appelle River (Thompson 1898); and Inlet Great Bear Lake (Preble, coll., 1903–4).

108. **Gasterosteus aculeatus** Linnæus. Common Stickleback.

Streams everywhere (in Greenland) (Fabricius 1780); Greenland (Pennant 1788, as *Three-Spined Stickleback*); Hudson Bay (Pennant 1788, as *Gasterosteus aculeatus*); "In the estuaries of rivers and in those creeks to which the sea has access, also upper St. John, Madawaska and Restigouche rivers" (Cox 1895a).

109. **Gasterosteus aculeatus cuvieri** (Girard).

Bras d'Or and Red Bay, Labrador (Storer 1850, *Gasterosteus cuvieri*, type); tidal fresh-water spring, near Salmon River, Labrador (Packard 1891, as *Pygosteus cuvieri*); Streams, ponds and lakes of Anticosti Island (Schmitt 1904, as *Gasterosteus bispinosus*).

FAMILY PERCOPSIDÆ.

110. **Percopsis guttatus** Agassiz. Trout Perch.

Lake Superior at Fort William (Agassiz 1850, type); Moose Factory, Hudson Bay (Walton Hayden, coll., Bean 1881); mouth of Nelson River (Robert Bell, coll., Bean 1881); Red River of the North at Winnipeg, Assiniboine River at Brandon, Lacawana Creek at Regina, Swift Current River at Swift Current, Saskatchewan River at Medicine Hat (Eigenmann 1894); Lake of the Woods at Rat Portage, off Coney Island and at Stevens Point (Woolman, coll., 1894); Winnipeg Lake, Winnipeg, and Brandon (Thompson 1898); Hayes River 15 miles above York Factory (Preble, coll., 1900); and near mouth Missisquoi River (Carter, coll., 1907).

FAMILY CENTRARCHIDÆ.

111. **Pomoxis sparoides** (Lacépède). Calico Bass.

Lake of the Woods at mouth of Rainy River (Woolman, coll., 1894); "waters of Quebec, Deep-Cut" and the Ottawa (Montpetit 1897, as *Pomoxys sparoides* and *Labrus sparoides*).

112. **Ambloplites rupestris** (Rafinesque). Rock Bass.

Lakes Huron, Ontario and Erie (Richardson 1836, as *Centrarchus æneus*); River St. Lawrence (Fortin 1864, as *Centrarchus æneus*).

113. **Eupomotis gibbosus** (Linnæus). Common Sunfish.

Lake Huron at Penetanguishene (Richardson 1836, as *Pomotis vulgaris*); Montreal (Fortin 1864, as *Pomotis vulgaris*); small stream near Baring, New Brunswick (Kendall 1894, as *Lepomis gibbosus*); Lower St. John River below Grand Falls, N. B. (Cox 1895a, as *Lepomus gibbosus*); and Gull and Muskoka lakes (Meek 1899).

114. **Micropterus dolomieu** Lacépède. Small-mouth Black Bass.

Lake Erie (Richardson 1836, as *Cichla fasciata*); Thousand Isles (Roosevelt 1884, as *Gristes nigricans*); River St. Lawrence between New York and Ontario (Rathbun and Wakeham 1897); introduced into Spruce Lake and other lacustrine waters of New Brunswick (Cox 1895a); Gull

and Muskoka lakes (Meek 1899); St. Lawrence River near Ogdensburg (Evermann and Kendall 1902).

115. **Micropterus salmoides** (Lacépède). Large-mouth Black Bass.

Lake Huron at Penetanguishene (Richardson 1836, as *Perca nigricans*); upper St. Lawrence River (Goode 1884); and Red River of the North (Thompson 1898).

FAMILY PERCIDÆ.

116. **Stizostedion vitreum** (Mitchill). Walleyed Pike; "Doré"; "Pickerel."

Hudson Bay (Pennant 1788, as *Perca fluviatilis*); Saskatchewan River at Cumberland House (Richardson 1823, as *Perca fluviatilis* var.); Lake Huron at Penetanguishene (Richardson 1836, as *Lucio-perca americana*); Albany River (Sir John Richardson, coll., Günther 1859, as *Lucioperca americana*); Montreal and lower St. Lawrence (Fortin 1864, as *Lucioperca americana*); St. Ignace Island, Lake Superior (Thomson 1883); Moose Factory, Hudson Bay (Walton Hayden, coll., Bean 1881); Lake St. John waters (Creighton 1892); Red River of the North at Winnipeg, Moose Jaw River at Moose Jaw, and Qu'Appelle River at Fort Qu'Appelle (Eigenmann 1894); Lake of the Woods at mouth of Rainy River, at Oak Island, at Asmus Point, and at Stevens Point (Woolman, coll., 1894); Big and Little Nekebau lakes, Obahtegooman, Ojebogoomon and adjacent waters, Mistassini, Wakwunitche, Lac à Jim and Lake Kiskisink (Chambers 1896); "Common in the southern rivers flowing into Lake St. John and to the westward, also in Rupert and East Main rivers, rare in Betsiamitz River and not found east of this stream, being unknown to the Indians of Mingan, not found in the Big River or streams to the north of it, nor in the rivers of the eastern or northern watersheds" (Low 1896); Great Lakes, St. Lawrence Basin, and Milieu River, an affluent of Saint-Maurice (Montpetit 1897); Lakes Winnipeg, Manitoba and Winnipegosis, Deer, Red, Souris and Winnipeg rivers, mouth of Nelson River (Thompson 1898); Hayes River at York Factory (Preble, coll., 1900).

117. **Stizostedion canadense** (Smith). Sauger.

Canada (Hamilton Smith in Griffith's Cuvier, 1834, as *Lucioperca canadensis*, type); Quebec (Richardson 1836, as *Lucio-perca canadensis*), and River St. Lawrence (Fortin 1864, as *Lucio-perca canadense*).

118. **Stizostedion canadense griseum** De Kay. Gray Sauger.

Red River of the North at Winnipeg and Assiniboine River at Brandon (Eigenmann 1894); and Winnipeg and Brandon (Thompson 1898).

119. **Perca flavescens** (Mitchill). Yellow Perch.

Lake Huron at Penetanguishene (Richardson 1836); Quebec (Baird, coll., 1853); Lakes Sugarbush, Bevin, Bark and a small lake communicating with Devils River (D'Urban 1859); River St. Lawrence (Fortin 1863); Qu'Appelle River at Fort Qu'Appelle, and Assini-

boine River at Brandon (Eigenmann 1894); Lake of the Woods at Rat Portage off Coney Island, Stevens Point, mouth of Rainy River, Asmus Point, Garden Island, and Oak Island (Woolman, coll., 1894); "Common in almost all the inland waters" (New Brunswick) (Cox 1895a); Little and Big Nekebau, Obahtegooman, Ojebogoomon and adjacent waters (Chambers 1896); basin of River St. Lawrence (Montpetit 1897); River St. Lawrence between New York and Ontario (Rathbun and Wakeham 1897); Lake Winnipegosis and Swan Lake, and in the small lakes at the head of Red Deer Lake and at Fort Qu'Appelle and Brandon (Thompson 1898); Gull and Muskoka lakes (Meek 1899); Metapedia river and lake (Cox 1899, as *Perca americana*); Glasier and Bear lakes, New Brunswick (Kendall, coll., 1901); St. Lawrence River near Ogdensburg (Evermann and Kendall 1902).

120. **Percina caprodes** (Rafinesque). Log Perch.

Small streams in Quebec (Baird, coll., 1853); St. Lawrence River near Ogdensburg (Evermann and Kendall 1902).

121. **Hadropterus aspro** (Cope & Jordan).

Red River of the North at Winnipeg and Assiniboine at Brandon (Eigenmann 1894, as *Etheostoma aspro*); and Winnipeg and Brandon (Thompson 1898).

122. **Hadropterus guntheri** (Eigenmann & Eigenmann).

Red River of the north at Winnipeg (Eigenmann and Eigenmann 1892, as *Etheostoma guntheri*, type), and Winnipeg (Thompson 1898).

123. **Boleosoma nigrum** (Rafinesque). Johnny Darter.

Lake Superior at Fort William (Agassiz 1850, as *Boleosoma maculatum*, type); White Mud River at Westbourne, Assiniboine River at Brandon and Qu'Appelle (Eigenmann 1894, as *Etheostoma nigrum*); St. Lawrence River near Ogdensburg (Evermann and Kendall 1902); Westbourne and in the Assiniboine River at Brandon (Thompson 1898); and Don River near Toronto (Nash 1906).

124. **Boleosoma nigrum olmstedi** (Storer).

Small streams of Quebec and at Montreal (Baird, coll., 1853); St. Lawrence River near Ogdensburg (Evermann and Kendall 1902).

125. **Etheostoma boreale** (Jordan).

Montreal (T. J. Doran, coll., Jordan 1884, as *Pœcilichthys boreale*, type); and Gull Lake (Meek 1899).

126. **Etheostoma iowæ** Jordan & Meek.

Swift Current River at Swift Current (Eigenmann 1894); Qu'Appelle River at Fort Qu'Appelle (Eigenmann 1894, as *Etheostoma quappelle*); and Fort Qu'Appelle (Thompson 1898).

127. **Etheostoma flabellare** Rafinesque. Fan-tailed Darter.

Small streams in Quebec (Baird, coll., 1853).

FAMILY SERRANIDÆ

128. **Roccus chrysops** (Rafinesque). White Bass.

Lower St. Lawrence River (Richardson 1836, as *Labrax notatus*); Lake Oromocto, one of the headwaters of the Magaguadavic River (Cox 1895a).

129. **Roccus lineatus** (Bloch). Striped Bass; Rock.

St. Lawrence as far as Quebec (Richardson 1836, as *Labrax notatus*); St. Lawrence River and some of its tributaries, and Sorel and Crane islands (Fortin 1863, as *Labrax lineatus*, and *Perca saxatilis*); St. Lawrence River to Quebec (Goode 1884); "Lakes and streams connected with the River St. Johns" (Cox 1895a, as *Roccus americanus*).

130. **Morone americana** (Gmelin). White Perch.

Lakes and streams connected with the River St. John (Cox 1895a, as *Roccus americanus*).

FAMILY SCIÆNIDÆ.

131. **Aplodinotus grunniens** Rafinesque. Freshwater Drum.

Lake Huron at Penetanguishene (Richardson 1836, as *Sciæna* (*Corvina*) *richardsoni*); Red River of the North at Winnipeg (Eigenmann 1894); Winnipeg (Thompson 1898).

FAMILY COTTIDÆ.

132. **Cottus asper** Richardson.

Fraser River at Mission, Shushwap Lake at Sicamous, Thompson River at Kamloops, and Griffin Lake (Eigenmann 1894).

133. **Cottus ictalops** (Rafinesque). Miller's Thumb; Blob.

North shore of Lake Superior (Agassiz 1850, as *Cottus richardsoni*, type); Mill Cove Stream, a tributary of the Miramichi River, N. B. (Cox 1895, and 1895a, as *Uranidea richardsoni*); and Green River, Madawaska, N. B. (Cox 1895a, as *Uranidea richardsoni*); St. Lawrence River near Ogdensburg (Evermann and Kendall 1902); in all the Gaspé rivers, except those discharging into Gaspé Basin, P. Q., and in Miramichi and Restigouche rivers, N. B., a peculiar type from Bonaventure River, P. Q. (Cox 1899, as *Uranidea richardsoni*).

134. **Cottus onychus** Eigenmann & Eigenmann.

Bow River at Calgary (Eigenmann 1892, type).

135. **Cottus cognatus** Richardson.

Great Bear Lake, type locality (Richardson 1836); Lake Bennett (Evermann and Goldsborough 1907).

136. **Cottus philonips** Eigenmann & Eigenmann.

Kicking Horse River at Field (Eigenmann and Eigenmann 1893, type).

137. **Cottus spilotus** (Cope).

Moose Factory, Hudson Bay (Walton Hayden, coll., Bean 1881, as *Uranidea spilota*).

138. **Cottus franklini** (Agassiz).

North and east shore of Lake Superior (Agassiz 1850, as *Cottus franklini*, type).

139. **Cottus gracilis** (Heckel).

Restigouche, affluents of the Miramichi, Madawaska and Green rivers (Cox 1895, as *Uranidea boleoides*); Green River "Madawaska County" (Cox 1895a), and Green River, Victoria County, N. B. (Cox 1895a); Metapedia River and Nouvelle River, P. Q. (Cox 1899); Bear Lake, New Brunswick (Kendall, coll., 1901).

140. **Cottus formosa** (Girard).

Madawaska River above Edmonston, N. B. (Cox 1895).

141. **Oncocottus quadricornis** (Linnæus).

York Factory (Preble, coll., 1900).

142. **Oncocottus hexacornis** (Richardson).

Mouth of Tree River near the Coppermine (Richardson 1836, as *Cottus hexacornis*, type); near York Factory, Hudson Bay (Robert Bell, coll., Bean 1881, as *Cottus labradoricus*).

143. **Triglopsis thompsoni** Girard.

In tide pools 75 miles north of York Factory (Preble, coll., 1900).

Family BLENNIIDÆ.

144. **Lumpenus fabricii** (Cuvier & Valenciennes).

Greenland (Fabricius 1780, as *Blennius lumpenus* and Cuvier and Valenciennes 1836, as *Gunnellus fabricii*, type); Fort Churchill and Barren Grounds near Cape Eskimo, Hudson Bay (Preble, coll., 1900).

Family GADIDÆ.

145. **Lota maculosa** (Le Sueur). Ling; Lawyer; "Burbot"; "Lush"; Freshwater Cusk.

Hudson Bay (Forster 1773, as *Gadus lota*); "every river and lake in the country" (Richardson 1823, as *Gadus lota*); Pine Island Lake (Richardson 1836, as *Gadus (Lota) maculosus*); Michipicotin, Lake Superior (Agassiz 1850); St. John and Oromocto rivers and Temiscouata, Eagle and St. Francis lakes (Perley 1852); River St. Lawrence (Fortin 1863, as *Lota inornata; Lota vulgaris*); Red River of the North at Winnipeg, Kicking Horse and Columbia rivers at Golden (Eigenmann 1894, as *Lota lota maculosa*); St. John River, Eagle and St. Francis lakes, Restigouche waters and Lake Utopia (Cox 1895a); common in all the deep lakes throughout the interior (of Labrador) (Low 1896); Lake St. John (Chambers 1896); basin of the aqueduct of Montreal and rivers flowing into Lake St. John (Montpetit 1897, as *Gadus lota*); Glasier Lake, New Brunswick (Kendall, coll., 1901); St. Lawrence River near Ogdensburg (Evermann and Kendall 1902); Seton Lake, B. C. (Babcock 1902, as *Ling*).

List of Nominal Species of Freshwater Fishes Originally Described from Canadian Waters.

An examination of the following tabular statement shows that 65 nominal species of freshwater fishes have been described from Canadian waters. The first of these was described by Forster in 1773 and the last by Meek in 1899.

Of these 65 nominal species only 29 are now regarded as valid.

Original Name.	Present Identification.	Type Locality.	Describer and Year.
Petromyzon borealis	? Lampetra aurea	Great Slave Lake	Girard 1858
Lepisosteus huronensis	Lepisosteus osseus	Lake Huron at Penetanguishene	Richardson 1836
Amia ocellicauda	Amia calva	Lake Huron	Richardson 1836
Synechoglanis beadlei	Ictalurus punctatus	St. Catherines, Ontario	Gill 1858
Silurus (Pimelodus) borealis	Ameiurus lacustris	Pine Island Lake	Richardson 1836
Silurus (Pimelodus) cœnosus	Ameiurus natalis	Lake Huron at Penetanguishene	Richardson 1836
Cyprinus catostomus	Catostomus catostomus	Hudson Bay	Forster 1773
Cyprinus (Catostomus) forsterianus	Catostomus catostomus	Lake Huron and Great Slave Lake	Richardson 1836
Catostomus lesueuri	Moxostoma lesueuri	Saskatchewan River at Carlton House	Richardson 1823
Leuciscus canadensis	Semotilus bullaris	St. Lawrence River at Montreal and Quebec	Fortin 1865
Notropis albeolus	Notropis jordani	Saskatchewan River at Medicine Hat	Eigenmann and Eigenmann 1893
Notropis jordani	Notropis jordani	Saskatchewan River at Medicine Hat	Eigenmann and Eigenmann 1893
Notropis heterolepis	Notropis cayuga	Qu'Appelle River at Qu'Appelle	Eigenmann and Eigenmann 1893
Notropis reticulatus	Notropis blennius	Assiniboine River at Brandon and Qu'Appelle River at Qu'Appelle	Eigenmann and Eigenmann 1893
Notropis muskoka	Notropis muskoka	Gull Lake	Meek 1899
Notropis scopifer	Notropis scopifer	Red River of the North at Winnipeg, Assiniboine River at Brandon, Qu'Appelle River at Qu'Appelle and Saskatchewan River at Medicine Hat	Eigenmann and Eigenmann 1893
Agosia shuswap	Agosia falcata	Shushwap Lake at Sicamous, B. C.	Eigenmann and Eigenmann 1893
Couesius greeni	Couesius greeni	Stuart Lake, B. C.	Jordan 1894
Cyprinus (Leuciscus) gracilis	Platygobis gracilis	Saskatchewan River at Carlton House	Richardson 1836
Hiodon chrysopsis	Hiodon alosoides	Saskatchewan River at Cumberland House	Richardson 1836
Cyprinus (Abramis?) smithii	Hiodon tergisus	Richelieu River	Richardson 1836
Salmo (Coregonus) quadrilateralis	Coregonus quadrilateralis	Fort Enterprise	Richardson 1823
Coregonus latior	Coregonus clupeiformis	Along the northern shores of Lake Superior	Agassiz 1850
Salmo (Coregonus) labradoricus	Coregonus labradoricus	Musquaw River	Richardson 1836
Coregonus angusticeps	? Coregonus labradoricus	Saskatchewan River	Cuvier and Valenciennes 1848
Coregonus artedi	Argyrosomus artedi	Lewistown, Upper Canada and Lake Erie	Le Sueur 1818
Salmo (Coregonus) harengus	Argyrosomus artedi	Lake Huron at Penetanguishene	Richardson 1836

Original Name.	Present Identification.	Type Locality.	Describer and Year.
Salmo (Coregonus) lucidus	Argyrosomus lucidus	Great Bear Lake	Richardson 1836
Salmo (Coregonus) tullibee	Argyrosomus tullibee	Saskatchewan River at Cumberland House, Pine Island Lake, and Albany District, Hudson Bay	Richardson 1836
Salmo mackenzii	Stenodus mackenzii	Mackenzie River	Richardson 1823
Salmo kennerlyi	Oncorhynchus nerka	Chiloweyuk Lake near Fraser River	Suckley 1861
Salmo warreni	Oncorhynchus nerka	Fraser River	Suckley 1861
Salmo richardii	Oncorhynchus nerka	Fraser and Skagit rivers	Suckley 1861
Salmo salar ouananiche	Salmo ouananiche	Saguenay River	McCarthy 1896
Salmo namaycush	Cristivomer namaycush	Hudson Bay	Walbaum 1792
Salmo hoodii (part)	Cristivomer namaycush	Mingan River	Richardson 1836
Salmo siscowet	Cristivomer namaycush siscowet	At Michipicotin and everywhere along the northern shores of Lake Superior	Agassiz 1850
Salmo hoodii (part)	Salvelinus fontinalis	Boothia Felix	Richardson 1836
Salmo immaculatus	Salvalinus fontinalis	Red Bay, Labrador	Storer 1850
Salmo hudsonicus	Salvelinus fontinalis	Hudson Bay and vicinity; Labrador and Newfoundland	Suckley 1861
Salmo parkii	Salvelinus malma	Kootenay River	Suckley 1861
Salmo alipes	Salvelinus alpinus alipes	Lakes in Prince Regents Inlet	Richardson 1836
Salmo nitidus	Salvelinus alpinus alipes	Lakes in Prince Regents Inlet	Richardson 1836
Salmo stagnalis Salmo rivalis	Salvelinus alpinus stagnalis	Mountain streams of Greenland	Fabricius 1780
Salmo hearnii	Salvelinus alpinus stagnalis	Coppermine River	Richardson 1823
Salmo rossii	Salvelinus alpinus stagnalis	Regents Inlet and rivers of Boothia Felix	Richardson 1836
Salmo marstoni	Salvelinus marstoni	Lac de Marbre, Ottawa County, Quebec	Garman 1893
Coregonus signifer	Thymallus signifer	Northward of Great Slave Lake	Richardson 1823
Coregonus thymalloides	Thymallus signifer	Little Winter River	Richardson 1823
Esox boreus	Esox lucius	Northern shores of Lake Superior	Agassiz 1850
Gasterosteus gymnetes	Eucalia inconstans	Near Montreal	Dawson 1859
Gasterosteus concinnus	Pygosteus pungitius	Saskatchewan River and Great Bear Lake	Richardson 1836
Gasterosteus cuvieri	Gasterosteus aculeatus cuvieri	Bras d'or and Red Bay, Labrador	Storer 1850
Percopsis guttatus	Percopsis guttatus	Lake Superior at Fort William	Agassiz 1850
Lucioperca canadensis	Stizostedion canadense	Canada	Smith 1834
Etherstoma guntheri	Hadropterus guntheri	Red River of the North at Winnipeg	Eigenmann and Eigenmann 1892
Boleosoma maculatum	Boleosoma nigrum	Lake Superior at Fort William	Agassiz 1850
Pœcilichthys boreale	Etheostoma boreale	Montreal	Jordan 1884
Cottus richardsoni	Cottus ictalops	North shore of Lake Superior	Agassiz 1850
Cottus cognatus	Cottus cognatus	Great Bear Lake	Richardson 1836
Cottus onychus	Cottus onychus	Bow River at Calgary	Eigenmann and Eigenmann 1892
Cottus philonips	Cottus philonips	Kicking Horse River at Field	Eigenmann and Eigenmann 1893
Uranidia franklini	Cottus franklini	North and east shore of Lake Superior	Agassiz 1850
Cottus hexacornis	Oncocottus hexacornis	Mouth of Tree River near the Coppermine	Richardson 1836

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The following freshwater species are recorded in this paper: *Salvelinus alpinus stagnalis* (as *Salmo hearnii* type), *Stenodus mackenzii* (as *Salmo mackenzii* type), *Coregonus clupeiformis* (as *Coregonus albus*), *Thymallus signifer* (as *Coregonus thymalloides* type), *Coregonus quadrilateralis*, *Hiodon tergisus* (as *Hiodon clodalis*), *Moxostoma lesueurii* (as *Catostomus lesueurii* type), *Ameiurus nebulosus* (as *Silurus felis*), *Lota maculosa* (as *Gadus lota*), *Stizostedion vitreum* (as *Perca fluviatilis* var.), and *Pygosteus pungitius* (as *Gasterosteus pungitius*).

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